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**Long-Term Surveillance and Maintenance
Operating Procedures
for the Monticello
Mill Tailings Site Repository and Millsite**

Volume I

April 2002

U.S. Department of Energy
Grand Junction Office
Grand Junction, Colorado

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Operating Procedures for the Monticello Mill Tailings Site Repository and Millsite (Volume I)

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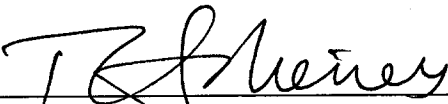
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Glossary

Asbestos—Material that is harmful to human health or the environment and that is specifically defined and regulated under the Toxic Substances Control Act.

Becquerel (bq)—The unit of measure of the quantity or activity of radioactive material which indicates the rate that atoms in the material are giving off radiation or disintegrating. One bq is equal to 1 disintegration per second.

Carrier Operators—Drivers of vehicles that transport radiologically contaminated materials having Ra-226 concentrations < 130 picocuries per gram (pCi/g) to the Temporary Storage Facility (TSF); carrier operators may include the Monticello LTSM Representative or city of Monticello or Utah Department of Transportation (UDOT) workers, or common carriers.

CERCLA Hazardous Substance—Material that is harmful to human health or the environment and that is specifically defined and regulated under CERCLA.

Certified Shipper—A person who has received DOE-approved training to ship radioactive or hazardous material and waste.

Contractor LTSM Project Manager—Grand Junction Office-based DOE-contractor employee responsible for administering the Monticello LTSM project.

Controlled Area—Any area to which access is managed in order to protect individuals from inadvertent exposure to radiation and/or radiologically contaminated materials. Individuals who enter only the controlled area without entering radiological areas are not expected to receive a total effective dose equivalent of more than 100 mrem in a year.

DOT Radioactive Material (DOT-RAM)—DOT-RAM is radioactive material that meets the DOT definition of radioactive material, that is, any material having a total activity exceeding 70 becquerels per gram. Total activity is the sum of all activities of the radionuclides present in the material.

Hazardous Substances—For purposes of this document, the term “hazardous substances” includes CERCLA hazardous substances present in concentrations greater than EPA’s risk-based clean-up concentrations, hazardous waste, polychlorinated biphenyls (PCBs), and asbestos. Hazardous substances have been confirmed by sampling and analysis or process knowledge to exceed EPA’s risk-based clean-up concentrations or meet the regulatory definition of hazardous waste, PCBs, or asbestos. These terms are also defined in this section.

Hazardous Waste—Waste material that is harmful to human health or the environment and that is specifically defined and regulated under the Resource Conservation and Recovery Act (RCRA).

Inspection—Review and observation by a formally constituted team for the purpose of oversight, mobilized either at regular intervals or in response to specific concerns.

Leachate Collection and Removal System—A series of perforated pipes designed to transfer water draining from the repository or Pond 4. The repository LCRS is above the primary liner. The Pond 4 LCRS is between the primary and secondary liners. Schematics of the repository and Pond 4 LCRSs are provided in Appendix B, the Repository Site LTSM Plan.

Leak Detection System—Sumps designed to detect and collect water that may have leaked through the primary liner of the repository or the secondary liner of Pond 4. Schematics of the repository and Pond 4 leachate detection systems are provided in Appendix B, the Repository Site LTSM Plan.

Low Specific Activity (LSA)—LSA material is defined by the DOT to include several distinct categories. For the purposes of this procedure the DOT definition of LSA-1 [49 CFR 173.403, (I) and (iv)] is used. LSA definition (I) is: “Ores containing only naturally occurring radionuclides (e.g., uranium, thorium) and uranium or thorium concentrates of such ores.” LSA definition (iv) is “Mill tailings, contaminated earth, concrete, rubble, other debris and activated material in which the Class 7 (radioactive material) is essentially uniformly distributed and the average specific activity does not exceed 10^{-6} A2/g.” The A2 value is obtained from 49 CFR 173.435.

Mixed Waste—Waste material that is regulated under RCRA as hazardous waste and meets the definition of radiologically contaminated material as provided in this section.

Monticello LTSM Representative—Monticello, Utah-based DOE-contractor employee residing in the Monticello area, and on call 24 hours a days, 7 days a week. A backup person is available to perform the duties required of the representative when necessary.

Polychlorinated biphenyl—Material that is harmful to human health or the environment and that is specifically defined and regulated under the Toxic Substances Control Act.

Radioactive Material Area (RMA)—An area or structure where radiologically contaminated material in excess of 130 pCi/g Ra-226 is used, handled, or stored.

Radiologically Contaminated Material Residual radioactive material resulting from DOE-related uranium and vanadium ore processing that contains Ra-226 concentrations exceeding background by more than 5 pCi/g in the surficial 15 centimeters (cm) of soil averaged over 100 square meters (m^2), or by more than 15 pCi/g on successively deeper 15 cm layers. Radiologically contaminated material with Ra-226 levels equal to 130 pCi/g or greater is classified as DOT-RAM. Radiologically contaminated material with Ra-226 levels less than 130 pCi/g is not DOT-regulated because it does not meet the DOT definition of radioactive material in 49 CFR 173.403.

Reportable Quantity Quantity of material defined in Table 1, Appendix A, of 49 CFR 172.101 and referenced under 40 CFR 302.4, that if released must be reported to the EPA.

Repository cover—A multilayered earthen and geomembrane barrier overlying the mill tailings. The cover is designed to prevent radon emission and create a barrier for surface water infiltration into the repository. Schematics are provided in Appendix B, Repository Site LTSM Plan.

SpillC Any accidental release of petroleum products, hazardous substances, or radiologically contaminated material from packaging, containments, or transport vehicles.

Supplemental Standards Properties—Property where radioactive contamination was left in place in compliance with 40 CFR, Part 192, “Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings.”

Surveillance—The act of monitoring or observing to determine whether an item or activity conforms to specified requirements; routine observation that does not require the involvement of formal inspection teams.

Transportation Incidents or EmergenciesC Any spill, release, accident, medical situation, or potential situation that may occur while loading, unloading, or inspecting a vehicle for transport; any spill, release, accident, medical situation, or potential situation that may occur while transporting materials in a vehicle on public highways.

End of current text

Acronyms

| | |
|---------------------|---|
| ARAR | applicable or relevant and appropriate requirements |
| bq | becquerel |
| bq/g | becquerel per gram |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| cm | centimeters |
| DOE | U.S. Department of Energy |
| DOT | U.S. Department of Transportation |
| DOT-RAM | DOE-radioactive material |
| dpm/cm ² | disintegrations per minute per square centimeter |
| EPA | U.S. Environmental Protection Agency |
| ft | feet |
| GERT | General Employee Radiation Training |
| GJO | Grand Junction Office |
| gpad | gallons per acre per day |
| gal/min | gallon per minute |
| HDPE | high density polyethylene |
| HPGe | High Purity Germanium |
| LCRS | leachate collection and removal system |
| LDS | leak detection system |
| LSA | low specific activity |
| LTSM | Long-Term Surveillance and Maintenance |
| m ² | square meters |
| MMTS | Monticello Mill Tailings Site |
| mrem/hr | millirem per hour |
| MVP | Monticello Vicinity Properties |
| PCB | polychlorinated biphenyl |
| pCi/g | picocuries per gram |
| Ra-226 | radium-226 |
| RCRA | Resource Conservation and Recovery Act |
| RCT | Radiological Control Technician |
| RMA | radioactive materials area |
| SARA | Superfund Amendments and Reauthorization Act |
| SCADA | Supervisory, Control, and Data Acquisition |
| TSF | Temporary Storage Facility |
| UDEQ | Utah Department of Environmental Quality |
| UDOT | Utah Department of Transportation |

Executive Summary

The Monticello Mill Tailings Site (MMTS) has been remediated by the U.S. Department of Energy (DOE) in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The contaminated material has been placed in the Monticello Repository near Monticello, Utah. As part of the CERCLA process, DOE will continue to monitor the sites, with oversight provided by the U.S. Environmental Protection Agency (EPA) Region VIII and the Utah Department of Environmental Quality (UDEQ), to ensure:

- compliance with applicable or relevant and appropriate requirements (ARARs),
- remedial actions taken remain protective of human health and the environment, and
- adequate information is collected for preparation of the CERCLA Five-Year Review Report.

This manual, the *Long-Term Surveillance and Maintenance Operating Procedures for the Monticello Mill Tailings Site Repository and Millsite* (Volume I), describes the procedures that will be followed by the DOE to monitor the Monticello repository and ancillary facilities. This manual will be used in conjunction with the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* which is an umbrella document describing all of the long-term surveillance and maintenance activities conducted at the MMTS and the Monticello Vicinity Properties (MVP) site.

The DOE, through various contractors, is committed to carrying out the procedures identified in this manual at the Monticello Mill Tailings site. The Monticello Long-Term Surveillance and Maintenance (LTSM) Representatives (contractor employees) are responsible for implementing the procedures in this manual.

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1.0 Manual Overview

This manual shall be used in conjunction with the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a) and the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a).

This manual is Volume I of the operating plans and procedures described in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a). Whereas the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a) is a generalized document describing the overall project, this volume provides detailed operating plans and procedures for conducting long-term surveillance and maintenance (LTSM) activities at the former Monticello millsite (excluding supplemental standards properties which are described in Volume II), and the Monticello repository including the temporary storage facility (TSF) and Pond 4. For purposes of this manual, the term “repository” includes the repository leachate collection and removal system (LCRS), the repository leak detection system (LDS), Pond 4, the Pond 4 LCRS and LDS, the repository and Pond 4 telemetry systems, and the repository cover (including all property within the fence surrounding the repository and Pond 4).

This manual will be updated on an as-needed basis and will be reviewed at least once every two years to ensure that the U.S. Department of Energy (DOE) is conducting LTSM at an appropriate level of effort. Procedures for updating and revising this manual are specified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a).

1.1 Information in this Manual

This manual is divided into sections listed below that describe the specific operating procedures for conducting LTSM activities.

Section 1.0, “Manual Overview,” is an annotated outline that can be used as a guide for using the manual.

Section 2.0, “Long-Term Surveillance and Maintenance Operating Procedures for the Repository Cover,” establishes operating procedures for long-term custodial activities for the repository cover. These activities are designed to detect and correct any potential damage to the repository cover at an early stage to preclude the need for major repairs.

Section 3.0, “Long-Term Surveillance and Maintenance Operating Procedures for the Repository Leachate Collection and Removal System and Leak Detection System,” specifies the operating procedures that will be used by the Monticello LTSM Representative to conduct routine surveillance and monitoring of water levels of repository LCRS and LDS. Procedures for entering manholes and collecting compliance samples are provided in this section.

Section 4.0, “Long-Term Surveillance and Maintenance Operating Procedures for Pond 4,” describes routine surveillance that is conducted to ensure that Pond 4 is maintained in a manner that will prevent unnecessary major repairs, maintenance activities are conducted in a timely manner, and problems (such as tears in the liner) are detected as soon as practical. The triggers

that would require compliance sampling and the associated sampling procedures are also discussed in this section.

Section 5.0, “Long-Term Surveillance and Maintenance Operating Procedures for the Former Millsite,” describes the LTSM activities conducted in the areas of the former millsite with the exception of supplemental standards areas. LTSM procedures for supplemental standards areas are provided in the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b). These procedures are designed to ensure that the land use restrictions and ground water protection measures implemented as a condition of transfer of the former millsite to the City of Monticello remain in effect.

Section 6.0, “Transportation of Radiologically Contaminated Material,” provides instructions for transporting radiologically contaminated material on public highways safely and in compliance with U.S. Department of Transportation (DOT) requirements. Additionally, Appendix 1 to this section provides guidance for calculating radium concentrations for transportation purposes.

Section 7.0, “Management of the Temporary Storage Facility,” provides instructions for personnel entry and exit, material handling and storage, inspections, and radiological posting and monitoring at the Temporary Storage Facility (TSF).

Each procedural section (Section 2.0 through Section 7.0) contains eight major subsections: Purpose, Scope, Definitions, Responsibilities, Procedure, Training, Records, and References. The content of each subsection is described as follows:

Purpose—Defines the work to be done and how that work will be accomplished.

Scope—Defines the applicability and limits of the procedure.

Definitions—Defines unfamiliar words or phrases that are used in the procedure.

Responsibilities—Defines the individuals and/or organizations that perform the procedure.

Procedure—Identifies the sequential preparations, operations, documentation, or verifications required to complete the procedure.

Training—Identifies the regulatory training required for personnel who are implementing the procedure.

Records—Identifies the records that are generated from the procedure.

References—Identifies the references, including regulations or standards, that were used to write the procedure.

Throughout the manual, various words are used to describe actions. The following words have the following meanings:

- “Shall” indicates a requirement, as do the synonyms “will” and “must.”
- “Should” indicates a recommendation.
- “May” indicates permission and is neither a requirement nor a recommendation.

Appendix A is color photographs of Utah-listed and San Juan County-listed noxious weeds. The photographs are intended to assist the Monticello LTSM Representative in identifying invasion of noxious weeds.

Appendix B is Chapter 3, “Repository Site LTSM Plan,” of the *Monticello Long-Term Surveillance and Maintenance Plan* (DOE 1998b), provides the detailed plans and rationale for conducting LTSM activities. This plan was reviewed by the Environmental Protection Agency (EPA) and the Utah Department of Environmental Quality (UDEQ) and is provided to demonstrate continuity of plans as well as provide reference details concerning the project history and design of the repository and Pond 4. Procedures implementing these plans are provided in Sections 2.0 through 7.0 and are divided into manageable units. The procedures are designed for the Monticello LTSM Representative (and other personnel required to support the Monticello LTSM Representative) to follow to ensure that all of the plan requirements are implemented.

Appendix C is the *Repository and Pond 4 and Groundwater Contingency Plan* (DOE 1998a). Appendices to this plan are not included because they are bulky and consist primarily of supporting documentation. It should be noted, however, that the calculations required to determine compliance with Utah Groundwater Protection Levels in the event of liner system failure are provided in Appendix F of the *Repository and Pond 4 and Groundwater Contingency Plan* (DOE 1998a).

Appendix D is the *Telemetry System Procedure*. This manual describes operation of the automatic data measurement and pump control system associated with water levels in the LCRS and the LDS of the repository and Pond 4.

Appendix E is the *Repository and Pond 4 Sampling and Analysis Plan* (DOE 2000) that provides details of sampling procedures including reference to analytical procedures, sample preservatives, sample collection techniques, and documentation.

1.2 References

U.S. Department of Energy, 1998a. *Repository and Pond 4 Groundwater Contingency Plan-Final*, MAC-MRAP 3.5.8, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, February.

———, 1998b. *Monticello Long-Term Surveillance and Maintenance Plan*, Chapter 3, Repository Site LTSM Plan, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, September.

U.S. Department of Energy, 2000. *Repository and Pond 4 Groundwater Contingency Sampling and Analysis Plan* prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, August.

———, 2001a. *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, MAC-LMNT 1.1.1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

2.0 Long-Term Surveillance and Maintenance Operating Procedures for the Repository Cover

2.1 Purpose

This LTSM section establishes how DOE will implement long-term custodial activities for the repository cover at the Monticello repository site in Monticello, Utah. This section describes the procedures that will be used by the Monticello LTSM Representative to conduct routine surveillance of the repository. The purposes of routine surveillance are to ensure that (1) the site is maintained in a manner that will prevent unnecessary major repairs, (2) maintenance activities are conducted in a timely manner, (3) problems (such as erosion) are detected as soon as practical, (4) unwanted intrusion by humans or other animals are detected and corrected, and (5) adequate information is gathered to lead to acceptable CERCLA five-year reviews.

2.2 Scope

The procedures within this section are applicable to routine surveillance activities and other activities conducted by the Monticello LTSM Representative and do not describe procedures associated with annual inspections (see Definitions subsection). Annual inspection procedures are described in *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Annual Inspections and CERCLA Five-Year Reviews*, Volume IV (DOE 2001c). The procedures are applicable to the area within the Monticello Repository boundary shown on [Figure 2-1](#).

2.3 Definitions

Contractor LTSM Project Manager—Grand Junction Office-based DOE-contractor employee responsible for administering the Monticello LTSM project.

Monticello LTSM Representative—Monticello, Utah-based DOE-contractor employee residing in the Monticello area, and on call 24 hours a days, 7 days a week. A backup person is available to perform the duties required of the representative when necessary.

Inspection—Review and observation by a formally constituted team for the purpose of oversight, mobilized either at annual intervals or in response to specific concerns.

Repository cover—A multilayered earthen and geomembrane barrier overlying the mill tailings. The cover is designed to prevent radon emission and create a barrier for surface water infiltration into the repository. Schematics are provided in Appendix B, Repository Site LTSM Plan.

Surveillance—The act of monitoring or observing to determine whether an item or activity conforms to specified requirements; routine observation that does not require the involvement of formal inspection teams.

2.4 Responsibilities

Contractor LTSM Project Manager—Will be responsible for ensuring routine surveillance is conducted in accordance with the LTSM Plans and this procedure. The LTSM Project manager will also be responsible for procuring subcontracts to conduct maintenance items that are beyond the capability of the Monticello LTSM Representative.

Monticello LTSM Representative(s)—Will be responsible for conducting routine surveillance of the repository cover and conducting small-scale custodial maintenance tasks associated with the repository cover. The Monticello LTSM Representative will also be responsible for notifying the Contractor LTSM Project Manager of any necessary maintenance items that are beyond his capability to conduct.

2.5 Procedure

The Monticello LTSM Representative shall implement the tasks required under the LTSM Program by adhering to this procedure.

2.5.1 Monthly Surveillance

The Monticello LTSM Representative shall visually inspect the cover of the repository, at a frequency of at least once each calendar month, looking primarily for evidence of cover cracking, wind or water erosion, structural discontinuity, and intrusions to the cover by plants or animals (including humans). At a minimum, the repository will be monitored for damage or disturbance to the following features:

- Site perimeter roads.
- Fences, gates, and locks.
- Warning Signs.
- Site Markers/Monuments.
- Site area vegetation or volunteer plant growth.
- Sedimentation or erosion.
- Drainage/runoff ditches.
- Structural instability that is due to differential settlement, subsidence, cracking, sliding, or creep.
- Erosion as evidenced by the development of rills (< 6 inches in depth) or gullies (> 6 inches in depth).
- Sedimentation or debris.
- Rapid deterioration of riprap caused by weathering or erosion.
- Rock or other repository material removal.
- Seepage.
- Human or animal intrusion (inadvertent or deliberate).
- Animal burrowing.
- Vandalism.

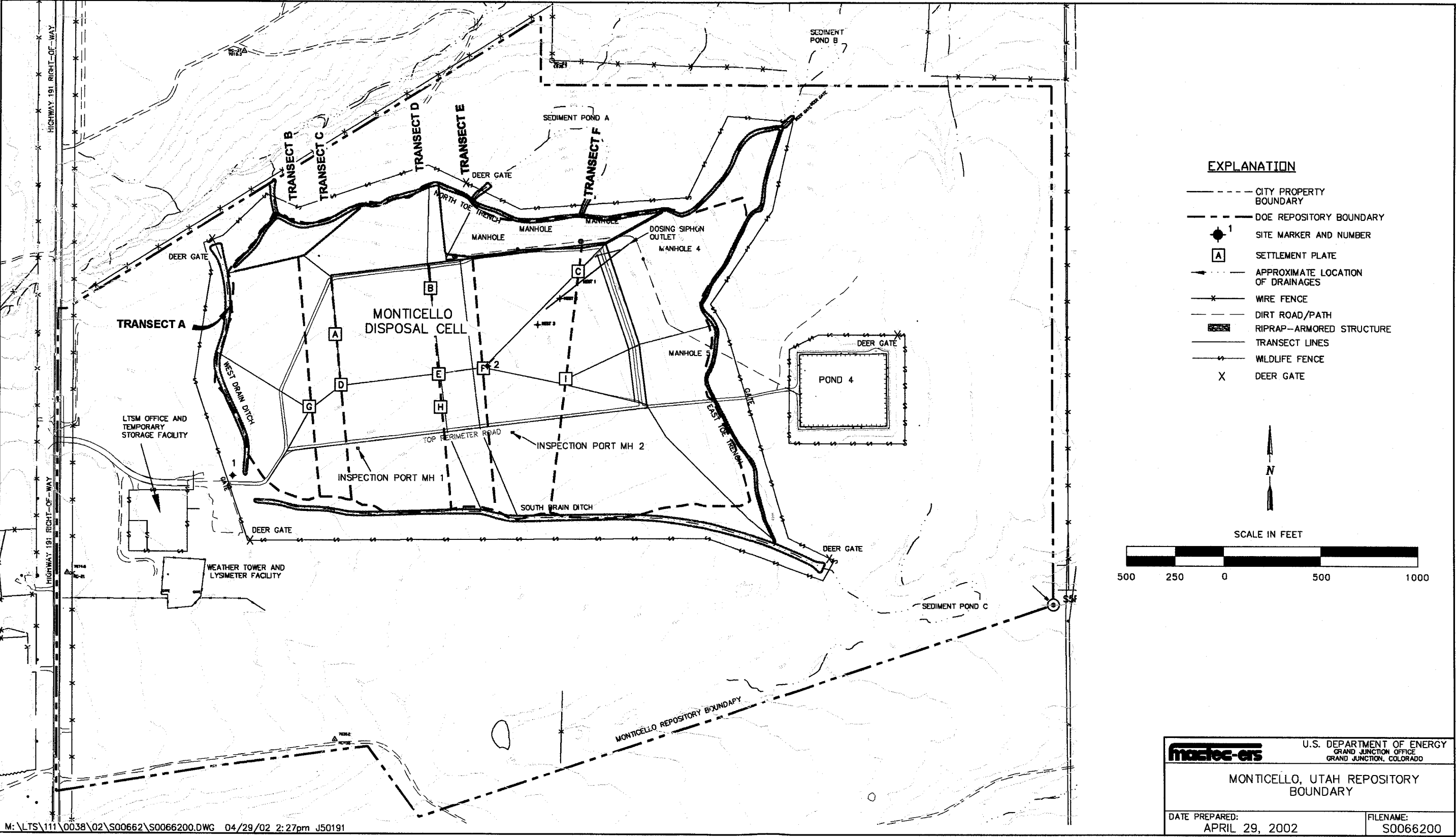


Figure 2-1. Monticello, Utah, Repository Boundary

- Human or animal trail development.
- Unwanted volunteer plant growth.

Meteorological monitoring will not be permanently conducted on-site as part of the LTSM. However, during the first 3 years following repository construction completion, meteorological data will be obtained as part of the inspection activities. To the extent feasible, data to be reported will include monthly wind speed, wind direction, temperature, barometric pressure, and precipitation. Following the initial 3-year period, DOE will evaluate future meteorological data needs and adjustments will be made if warranted, and proposed to EPA and UDEQ for review and concurrence. At the time of the monthly repository cover surveillance, the Monticello LTSM Representative shall check the meteorological station located at the Monticello Field Office and record the monthly wind speed, wind direction, temperature, barometric pressure, and precipitation on the Monthly Repository Surveillance Checklist (Figure 2–2).

The Monticello LTSM Representative shall monitor the condition of the repository cover as follows:

- Obtain a copy of the checklist provided in Figure 2–2. This checklist shall be used as a guide for conducting the surveillance and shall be completed at the time of the inspection. All entries shall be made in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, Section 9.0, “Records Management.”
- Drive to high points to view the fence line along the perimeter of the repository and visually inspect items on the checklist.
- Drive or walk the road on top of the repository and visually inspect items on the checklist.
- Observe the repository cover for growth of noxious weeds. Color photographs of the Utah and San Juan County-listed noxious weeds are provided in Appendix A.
- Photograph erosional features within the fenced Repository and record them in the Repository Record Book in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, “Records Management.”
- Visually inspect the following general inspection features:
 - Access gates
 - Access roads
 - Signs
 - Perimeter fence
- Look for and make note of:
 - Intrusion by livestock or wildlife
 - Trash accumulation
 - Earth movement, erosion, or changes in channels that could affect the property
 - Condition of settlement plates. It is not necessary to open the plates for the monthly inspection.

Monthly Repository Surveillance Checklist

Monticello LTSM Representative _____

Signature _____ Date _____

Meteorological Data for the period beginning _____ ending _____

Average wind speed _____ Prevailing wind direction _____

Average temperature _____ High Temperature _____ Low Temperature _____

Current barometric pressure _____

Total precipitation _____ Inches of Precipitation in last 24 hours _____

| Inspection Item | Acceptable (Yes/No) | Comments and Recommendations |
|-----------------------------|------------------------|------------------------------|
| <u>Condition of:</u> | | |
| Fences and Gates | _____ | _____ |
| Roads | _____ | _____ |
| Signs | _____ | _____ |
| Site Markers | _____ | _____ |
| Drainage ditches | _____ | _____ |
| Manholes | _____ | _____ |
| Settlement Plates | _____ | _____ |
| Vegetation | _____ | _____ |
| Evidence of erosion of: | | |
| Top of Repository | _____ | _____ |
| Repository Sideslopes | _____ | _____ |
| Ditches | _____ | _____ |
| Surrounding area | _____ | _____ |
| Evidence of: | | |
| Vandalism | _____ | _____ |
| Intrusion by wildlife | _____ | _____ |
| Burrowing Animal Damage | _____ | _____ |
| Intrusion by humans | _____ | _____ |
| Accumulation of trash | _____ | _____ |
| Additional Comments | | |
| _____ | | |
| _____ | | |
| _____ | | |

Figure 2–2. Monthly Checklist for Repository Surveillance

- Evaluate the need for maintenance actions, particularly erosion control, sign replacement, and fence repairs.
- Record the results of the monthly surveillance on the checklist and maintain the checklists in the Monticello Field Office in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, “Records Management.”

2.5.2 Quarterly Surveillance

The quarterly repository surveillance is conducted in February, May, August, and November and is in lieu of the monthly surveillance. The quarterly repository surveillance includes all of the steps from Section 2.5.1 plus the additional requirements listed below.

The Monticello LTSM Representative shall walk Transects A-F identified on [Figure 2–3](#) and visually inspect the cover of the repository, at a frequency of at least once each quarter, looking primarily for evidence of cover cracking, wind or water erosion, structural discontinuity, and intrusions to the cover by plants or animals (including humans). During the quarterly surveillance, specific transects are walked, manhole covers are opened, and settlement plate caps are removed to ensure a close inspection. For safety consideration, it is not necessary to walk on rip-rapped portions of the repository.

While walking Transect A (the toe of the repository cover), the Monticello LTSM Representative shall pay particular attention to the 10:1 and 5:1 slopes to look for nick points or intrusion points. While walking Transects B-F, the Monticello LTSM Representative shall pay particular attention to intrusion points directly over tailings (as opposed to the side slopes), evidence of settling, or poor storm water drainage.

The inspection checklist used for the quarterly monitoring is provided in [Figure 2–4](#). The Monticello LTSM Representative shall note in the comment section that Transects A-F were walked during the surveillance. Record the results of the quarterly surveillance on the checklist and maintain the checklists in the Monticello Field Office in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, “Records Management.”

The Monticello LTSM Representative shall monitor the condition of the repository cover as follows:

- Obtain a copy of the checklist provided in [Figure 2–4](#). This checklist shall be used as a guide for conducting the surveillance and shall be completed at the time of the inspection. All entries shall be made in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, “Records Management.”
- Drive to high points to view the fence line along the perimeter of the repository and visually inspect items on the checklist.
- Drive or walk the road on top of the repository and visually inspect items on the checklist.

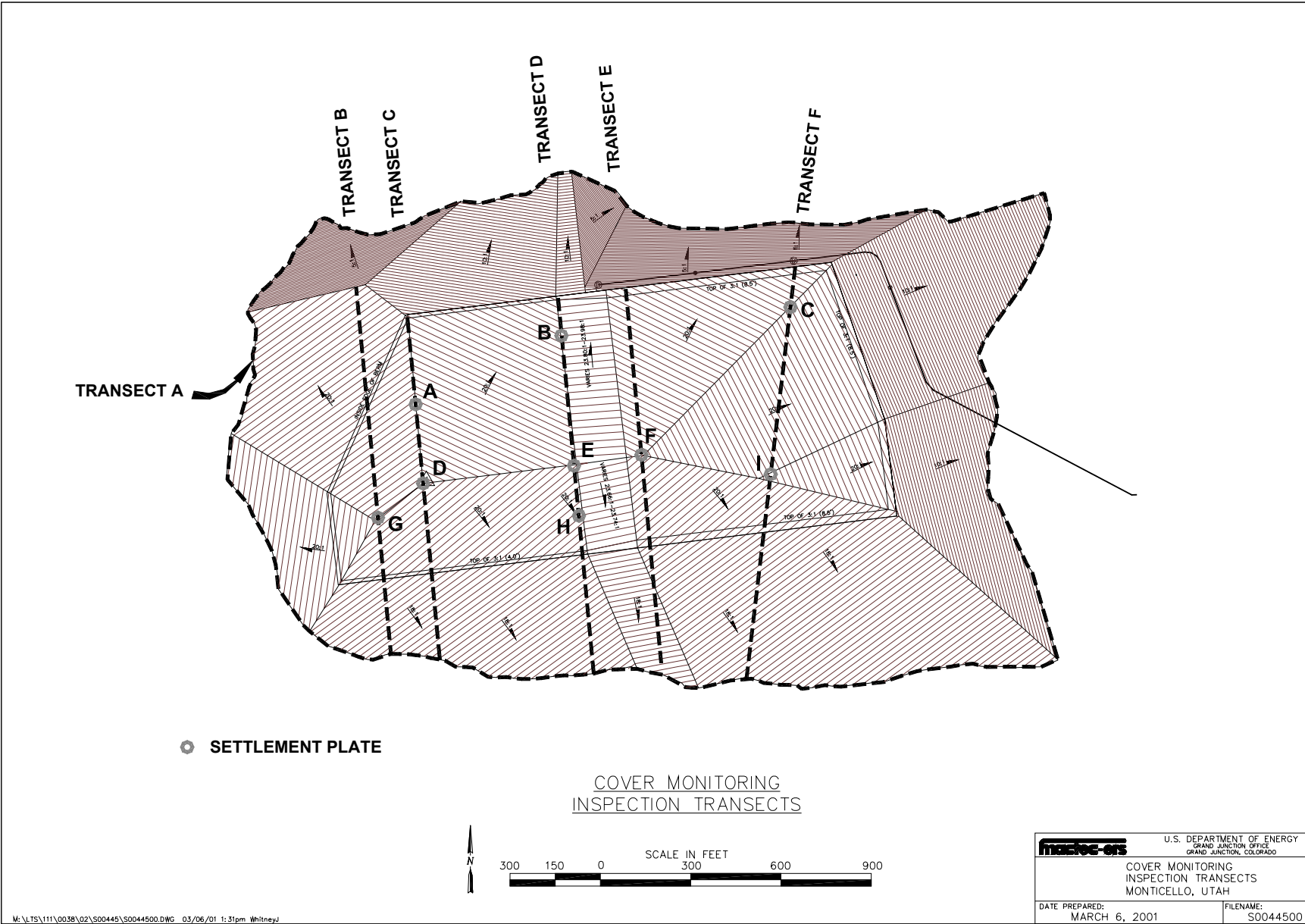


Figure 2–3. Cover Monitoring Inspection Transects

Quarterly Repository Surveillance Checklist

Monticello LTSM Representative _____

Signature _____ Date _____

Meteorological Data for the period beginning _____ ending _____

Average wind speed _____ Prevailing wind direction _____

Average temperature _____ High Temperature _____ Low Temperature _____

Current barometric pressure _____

Total precipitation _____ Inches of Precipitation in last 24 hours _____

| Inspection Item | Acceptable (Yes/No) | Comments and Recommendations |
|--------------------------------|------------------------|------------------------------|
| <u>Condition of:</u> | | |
| Fence | _____ | _____ |
| Roads | _____ | _____ |
| Signs | _____ | _____ |
| Site Marker | _____ | _____ |
| Drainage ditches | _____ | _____ |
| Manholes | _____ | (open to inspect) |
| Settlement Plates | _____ | (open to inspect) |
| Vegetation | _____ | _____ |
| Sediment Ponds | _____ | _____ |
| <u>Evidence of erosion of:</u> | | |
| Top of Repository | _____ | _____ |
| Repository Sideslopes | _____ | _____ |
| Ditches | _____ | _____ |
| Surrounding area | _____ | _____ |
| <u>Evidence of:</u> | | |
| Structural Instability | _____ | _____ |
| Vandalism | _____ | _____ |
| Intrusion by wildlife | _____ | _____ |
| Burrowing Animal Damage | _____ | _____ |
| Intrusion by humans | _____ | _____ |
| Accumulation of trash | _____ | _____ |
| Additional Comments | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

Note: All transects must be walked during this inspection

Figure 2–4. Quarterly Checklist for Repository Surveillance

- Open manholes and inspect for damage.
- Open settlement plate caps and inspect for damage.
- Inspect the repository cover for growth of noxious weeds. Color photographs of the Utah and San Juan County-listed noxious weeds are provided in Appendix A.
- Photograph erosional features and record them in the Repository Record Book in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, “Records Management.”
- Visually inspect the following general inspection features:
 - Access gates
 - Access roads
 - Signs
 - Perimeter fence
- Look for and make note of:
 - Intrusion by livestock or wildlife
 - Trash accumulation
 - Earth movement, erosion, or changes in channels that could affect the property
 - Condition of settlement plates. It is necessary to open the settlement plate caps for the quarterly inspection.
- Evaluate the need for maintenance actions, particularly erosion control, sign replacement, and fence repairs.
- Record the results of the quarterly surveillance on the checklist and maintain the checklists in the Monticello Field Office in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, “Records Management.”

The settlement plates shall be surveyed for vertical and/or horizontal displacement each quarter. The Monticello LTSM Representative will call the Contractor Project Manager to arrange for the survey to be conducted.

2.5.3 Surveillance Triggered by a Storm Event

In addition to monthly monitoring, the Monticello LTSM Representative shall conduct a surveillance after each 25-year storm event. After significant storm events, the Monticello LTSM Representative shall check the rain gauge at the Temporary Storage Facility.

If 2.8 inches or more of rain falls within a 24-hour period (equivalent to a 25-year storm event),

then:

- Obtain a copy of the checklist provided in Figure 2–2.

- Drive or walk the perimeter roads around the repository and visually inspect for evidence of erosion.
- Drive or walk the road on top of the repository and visually inspect for evidence of erosion.
- Photograph erosional features and make a notation of the features in the Repository Record Book checklist in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, "Records Management."
- Record the results of the surveillance, including the inches of precipitation, on the checklist in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001b), Section 9.0, "Records Management."

Localized storms that cause erosion in parts of the Monticello site may miss the rain gauge station. Intense storms for very short durations that do not discharge 2.8 inches or more of rain may also result in erosion damage. As a best management practice, a storm damage surveillance may be conducted and documented in accordance with this section by the Monticello LTSM Representative.

2.5.4 Corrective Action

The Monticello LTSM Representative shall conduct or report necessary maintenance activities identified as a result of monthly and quarterly surveillances. The Monticello LTSM Representative shall, at his discretion, conduct those maintenance activities that can be done safely and cost effectively using hand tools. Examples of maintenance activities performed by the Monticello LTSM Representative could include installing or repairing signs, weed control, repairing damaged sections of fence, installing temporary barriers, and cleaning up wind blown trash. All work conducted by the Monticello LTSM Representative shall be in accordance with the requirements of the *Monticello LTSM Project Safety Plan* (DOE 2001a).

If, in the professional opinion of the Monticello LTSM Representative, he cannot conduct necessary maintenance because the job is too big or requires specialized tools, heavy equipment, or specialized skill (such as electrical work), the Monticello LTSM Representative shall notify the Contractor LTSM Project Manager of the required maintenance. The Contractor LTSM Project Manager shall develop plans and procure a contractor to conduct the required maintenance.

In the event that erosion is occurring to the degree that the repository design could be compromised, the Monticello LTSM Representative shall inform the Contractor LTSM Project Manager. The Contractor LTSM Project Manager shall develop a plan to mitigate the problem and, if necessary, procure a contractor to implement the plan. The Contractor LTSM Project Manager shall inform the DOE Grand Junction Office (DOE-GJO) LTSM Project Manager who will notify EPA and UDEQ of the situation.

2.5.5 Emergency Measures

The repository site may require emergency measures as a result of extreme natural events or purposeful intrusion.

DOE will notify EPA and UDEQ within 24 hours upon discovery of any emergency conditions regarding the repository site. Because the Monticello LTSM Representative is onsite during normal working hours, it is anticipated that he will discover or be informed by the general public of any emergency situation. In emergency situations, the Monticello LTSM Representative shall follow the requirements of the *Monticello LTSM Project Safety Plan* (DOE 2001a). The Monticello LTSM Representative shall notify the Contractor LTSM Project Manager of any emergency situations. The Contractor LTSM Project Manager will notify the DOE–GJO LTSM Project Manager who will notify EPA and UDEQ of any emergency situations that potentially affect the integrity of the site.

Reporting of emergency conditions by the general public is effectuated by publishing contact telephone numbers. The cellular telephone numbers and Monticello Field Office telephone numbers of the Monticello LTSM Representatives and the 24-hour telephone number [(970)-248-6070] for contacting DOE–GJO are posted on the entrance to the Repository site and on the Pond 4 gate.

2.6 Training

To conduct the procedures outlined within this section, the Monticello LTSM Representative shall complete:

- Radiological Worker II training and annual refreshers.
- LTSM Training (specifically discusses LTSM procedures).

2.7 Records

The following records will be generated by this procedure:

- Bound LTSM Repository Record Book.
- Inspection checklists.
- Photographs of special features taken by the Monticello LTSM Representative during routine surveillance.
- Training records.

2.8 References

U.S. Department of Energy, 2001a. *Monticello LTSM Project Safety Plan*, Revision 0, GJO-2001-231-TAR, MAC-LMNT 13.2-1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, August.

U.S. Department of Energy, 2001b. *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, MAC-LMNT 1.1.1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December..

———, 2001c. *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Annual Inspections and CERCLA Five-Year Reviews*, Volume IV, MAC-LMNT 1.1.1-4, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

End of current text

3.0 Long-Term Surveillance and Maintenance Operating Procedures for the Repository Leachate Collection and Removal System and Leak Detection System

3.1 Purpose

This section describes the procedures that will be used by the Monticello LTSM Representative to conduct routine surveillance of the repository LCRS and LDS. The purposes of routine surveillance are to ensure that (1) the repository LCRS and LDS are maintained in a manner that will ensure proper functioning and prevent unnecessary major repairs, (2) maintenance activities are conducted in a timely manner, (3) problems (such as nonfunctional pumps) are detected as soon as practical, and (4) adequate information is gathered to lead to acceptable CERCLA five-year reviews.

3.2 Scope

The procedures within this section are applicable to the LTSM activities related to repository LCRS and LDS that are conducted by the Monticello LTSM Representative.

3.3 Definitions

Contractor LTSM Project Manager—Grand Junction Office-based DOE-contractor employee responsible for administering the Monticello LTSM project.

Monticello LTSM Representative—Monticello, Utah-based DOE-contractor employee residing in the Monticello area, and on call 24 hours a days, 7 days a week. A backup person is available to perform the duties required of the representative when necessary.

Inspection—Review and observation by a formally constituted team for the purpose of oversight, mobilized either at regular intervals or in response to specific concerns.

Leachate Collection and Removal System—A series of perforated pipes designed to transfer water draining from the repository. Schematics of the repository and Pond 4 LCRSs are provided in Appendix B, the Repository Site LTSM Plan. The repository LCRS is above the primary liner. The Pond 4 LCRS is between the primary and secondary liners.

Leak Detection System—Sumps designed to detect and collect water that may have leaked through the primary liner of the repository or the secondary liner of Pond 4. Schematics of the repository and Pond 4 leachate detection systems are provided in Appendix B, the Repository Site LTSM Plan.

Surveillance—The act of monitoring or observing to determine whether an item or activity conforms to specified requirements; routine observation that do not require the involvement of formal inspection teams.

3.4 Responsibilities

Contractor LTSM Project Manager—Will be responsible for ensuring that the requirements in this procedure are conducted by the Monticello LTSM Representative, for developing necessary corrective action plans, and for implementing corrective action. If the repository liners leak, the Contractor Project Manager shall be responsible for implementing the contingency actions specified in the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a).

DOE–GJO LTSM Project Manager—Will be responsible for interfacing with EPA and UDEQ.

Monticello LTSM Representative—Will be responsible for conducting routine maintenance activities associated with the repository LCRS and LDS, monitoring water levels within the LCRS and LDS, and apprising the Contractor LTSM Project Manager of potential problems associated with repository LCRS and LDS.

3.5 Procedure

Repository Design

The repository was designed as a permanent depository for all the materials removed from the millsite and from Monticello vicinity and peripheral properties. The design allows the materials to be isolated from the environment so that release mechanisms, such as leaching, radon flux, and wind and water transport, cannot spread contamination into the environment. The design combines the Utah Hazardous Waste Management Rules minimum technology requirements at UAC R315-8 for repository liners and EPA minimum technology guidance for covers with project-specific enhancements to attain the required degree of protection. The repository design was approved by the oversight regulatory agencies.

The repository covers approximately 90 acres; a clean-fill berm of varying height defines its perimeter. The repository is divided into two subcells, each with an independent system for collecting fluids draining from the contaminated material. The cover design mitigates surface water influx, thus reducing the potential of groundwater contamination, and serves as a barrier to radon emissions by maximizing radon attenuation.

The repository is divided into two cells, each with its own LCRS and LDS. Cell 1 is the western portion of the repository and Cell 2 is the eastern portion of the repository. Manhole #1 provides access to LCRS1 and LDS1. LCRS1 removes leachate from Cell 1 and LDS1 detects leaks in the liner of Cell 1. Manhole #3 provides access to the LCRS2 and LDS2. LCRS2 removes leachate from Cell 2 and LDS2 detects leaks in the liner of Cell 2.

The liner and leachate control system constitute a double composite liner system that consists of (1) a primary LCRS, (2) a primary composite liner, (3) a LDS, and (4) a secondary composite liner. The entire system rests on a 1-foot layer of prepared native soil. Each composite liner consists of a 60-mil high-density polyethylene (HDPE) geomembrane overlying a geosynthetic clay liner. A separate anchor trench was used to secure each composite liner in place along the repository side slopes. The primary LCRS is a 12-inch sand layer drained by a network of

perforated pipe. The drainage system above the primary composite liner is designed to collect leachate draining from the repository and to limit the head buildup on the liner system. The LDS is constructed with a geonet that provides for rapid movement of leachate through the system to the LDS sumps. The LDS provides confirmation of the integrity of the primary composite liner and is the point of compliance for the repository.

EPA and UDEQ have concurred on an action leakage rate for the repository LDS of 20 gallons per acre per day (gpad) based on the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a) approval letter from Mr. David Bird, State of Utah, to Mr. Paul Mushovic, EPA Region VIII, dated May 15, 1998. The *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a) is provided as Appendix C. As a conservative measure, leakage rates are calculated individually for Cell 1 and Cell 2 and are based on the area of the floor of the cell. Cell 1 covers 9.73 acres resulting in an action leakage rate of 194.6 gallons per day. Cell 2 covers 10.79 acres resulting in an action leakage rate of 215.8 gallons per day.

A summary of the LTSM requirements applicable to the LCRS and LDS is provided below:

- Monthly monitoring of the volume of water produced by the repository LCRS until leachate is no longer generated. LCRS reporting/recording will be reviewed annually to determine monitoring requirements.
- Monthly monitoring of the volume of water collected in the LDS.
- Sampling of water collected in the LDS.
- Report water monitoring data to UDEQ and EPA monthly.

A telemetry system is installed to allow continuous real time monitoring of water levels present in the LCRS and LDS. Operational instructions for the telemetry system are provided in the *Telemetry System Procedure*, Appendix D.

3.5.1 Weekly Water Level Monitoring

The Monticello LTSM Representative shall take the following actions:

- At a minimum of once each week, review the water levels and pumping rates displayed on the telemetry system monitor. Look for anomalies, such as high levels or increased flow rates, that would indicate changing repository conditions, failure of the telemetry system, failure of pumps, or failure of the liner systems.
- If the leachate level in LCRS1 or LCRS2 exceeds the high water level, check the pump and controls for proper operation and correct deficiencies as required.
- Perform any required maintenance or corrective action in accordance with the *Monticello LTSM Project Safety Plan* (DOE 2001a). If, in the best professional opinion of the Monticello LTSM Representative, the required maintenance is beyond the capability of the Monticello LTSM Representative, inform the Contractor LTSM Project Manager of the need for additional maintenance or corrective action.

3.5.2 Monthly Water Level Monitoring

Once each month, print a report indicating the volume of water pumped from LCRS1 and LCRS2, and the level of water in LDS1 and LDS2. Indicate if any water has been pumped from the LDSs. File this report in the Telemetry Data Book. This data book is a loose-leaf notebook located in the Monticello LTSM Representative's office checklist and maintained in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, (DOE 2001b) Section 9.0, "Records Management."

Figure 3–1 is an example of the report for the Telemetry Data Book.

3.5.2.1 Water in LCRS

Water is anticipated to drain from the material placed in the repository for 5 to 20 years from the time of cell closure. This water will be collected in the LCRS. The Monticello LTSM Representative shall make certain that this water is pumped into Pond 4 in accordance with the procedures listed in Appendix D, *Telemetry System Procedure*.

3.5.2.2 Zero Water in LCRS

If the volume of water in LCRS1 and LCRS2 remains below the pump operating level for 3 consecutive months, DOE will contact EPA and UDEQ to discuss changing the monitoring frequency.

3.5.2.3 Zero Water in LDS

If the volume of water in LDS1 and LDS2 remains below the pump operating level for 3 consecutive months, DOE will contact EPA and UDEQ to discuss changing the monitoring frequency.

3.5.2.4 Water in LDS is Greater Than Zero and Less Than Action Leakage Rate

If the volume of water pumped from either LDS is greater than zero and less than the action leakage rate of 20 gpad (194.6 gallons per day for Cell 1 or 215.8 gallons per day for Cell 2):

- Notify the Contractor LTSM Project Manager of the leakage rate.

[The Contractor LTSM Project Manager shall notify the DOE–GJO LTSM Project Manager of the leakage rate. It is the DOE–GJO LTSM Project Manager's responsibility to notify EPA and UDEQ of leakage into the LDS. The Contractor LTSM Project Manager shall implement the contingency actions specified in the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a).]

- Check the LCR pump and controls for proper operation and correct deficiencies as required.

| Total Gallons Pumped from LDSI as Measured by Flow meter Weekly Basis | | | | | | Inflow average between pumping events to 0.8 ft level in sump or dry | | | | | |
|---|-------------------|--------------------|-----------------------------|-------------------|---|--|-----------------|--------------------|-----------------------------|-------------------|---|
| Week Begin | Total for Week | Average Per Day | Gallons Per Acre Per Day | Number of Days | Comments | Event Date | Total Amount | Average Per Day | Gallons Per Acre Per Day | Number of Days | Comments |
| 12/28/98 | 0 | | | | | 4/12/99 | 763 | 6.81 | 0.68 | 112 | |
| 1/4/99 | 0 | | | | | 4/26/99 | 520 | 37.14 | 3.71 | 14 | |
| 1/11/99 | 0 | | | | | 8/9/99 | -2.0 | -0.02 | 0.00 | 105 | 1158 gallons water pumped in for testing deducted |
| 1/18/99 | 0 | | | | | | | | | | |
| 1/25/99 | 31 | | | | Pumped for testing | | | | | | |
| 2/1/99 | 1 | | | | Pumped for testing | | | | | | |
| 2/8/99 | 2 | | | | Pumped for testing | | | | | | |
| 2/15/99 | 0 | | | | | | | | | | |
| 2/22/99 | 0 | | | | | | | | | | |
| 3/1/99 | 0 | | | | | | | | | | |
| 3/8/99 | 0 | | | | | | | | | | |
| 3/15/99 | 0 | | | | | | | | | | |
| 3/22/99 | 0 | | | | | | | | | | |
| 3/29/99 | 0 | | | | | | | | | | |
| 4/5/99 | 20 | | | | See Note Pumped for testing | | | | | | |
| 4/12/99 | 769 | 6.8 | 0.7 | | 112 (112 days to last pumping event) Level readings off line, system pumped until sump was dry. | | | | | | |
| 4/19/99 | 0 | | | | | | | | | | |
| 4/26/99 | 520 | 37.1 | 3.7 | | 14 (14 days to last pumping event) Level readings off line, system pumped until sump was dry. | | | | | | |
| 5/3/99 | 81 | | | | Pumped for testing. Level readings brought back online April 28, 1999. | | | | | | |
| 5/10/99 | 553 | | | | Testing LDS I High Level transducer. Pumped in 1158 Gallons of water into system to verify probe set at correct level. Probe found to be defective and replaced | | | | | | |
| 5/17/99 | 65 | | | | Pumped for testing | | | | | | |
| 5/24/99 | 0 | | | | | | | | | | |
| 5/31/99 | 0 | | | | | | | | | | |
| 6/7/99 | 0 | | | | | | | | | | |
| 6/14/99 | 0 | | | | | | | | | | |
| 6/21/99 | 0 | | | | | | | | | | |
| 6/28/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 7/5/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 7/12/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 7/19/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 7/26/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 8/2/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 8/9/99 | 248 | -2.0 | -0.2 | | 105 (105 Days to last pumping event.) Subtracted 1158 gallons pumped in on 5/10. Negative number reflective of system sensitivity. | | | | | | |
| 8/16/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 8/23/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 8/30/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 9/6/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 9/13/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 9/20/99 | 0 | | | | MODICON in site 1 & 3 PLC not engaging pumps at set point values due to power failures and surges | | | | | | |
| 9/27/99 | 0 | | | | Modicon is scheduled to repair & reprogram system for October 9, 1999. | | | | | | |
| 10/4/99 | 0 | | | | Modicon is RE-scheduled to repair & reprogram system for October 23, 1999. | | | | | | |
| 10/11/99 | 0 | | | | Primary HDPE cover now covers entire repository as of Oct 10, 1999. | | | | | | |
| 10/18/99 | 0 | | | | Modicon on site doing new programming and service | | | | | | |
| 10/25/99 | 0 | | | | | | | | | | |
| 11/1/99 | 10 | | | | Modicon being serviced / Pump turned on to field test new system software & hardware | | | | | | |
| 11/8/99 | 0 | | | | Powerlines down for rewire for new ditch on west side of the repository, no reading taken. | | | | | | |
| 11/15/99 | 0 | | | | | | | | | | |
| 11/22/99 | | | | | No reading power down for new ditch being dug on east side of repository | | | | | | |
| 11/29/99 | | | | | No reading power down for new ditch dug on east side of repository unable to restore power due to site shutdown from accident on 11/27/99 | | | | | | |
| 12/6/99 | | | | | No reading power still down for new ditch being dug | | | | | | |
| 12/13/99 | 0 | | | | | | | | | | |
| 12/20/99 | 0 | | | | | | | | | | |
| 12/27/99 | | | | | | | | | | | |

Prepared by Todd Moon

L:\share\Telemetry\sumdeb.xls

Figure 3-1. Example of Telemetry Data Report

- Sample the LDS leachate in accordance with Section 3.5.4 of this procedure. The LDS shall be sampled on a quarterly basis for heavy metals, radiologic components, characteristic hazardous waste placed in the repository, and common ions as listed in Appendix C, *Repository and Pond 4 Groundwater Contingency Plan*. In addition to the quarterly sampling, sample the LDS on an annual basis for the constituents listed in Appendix H of the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a). Note: Sampling of the LDS was initiated in November 2000.

3.5.2.5 Water in LDS is Greater Than Action Leakage Rate

If the volume of water pumped from either LDS is greater than 20 gpad (194.6 gallons per day for Cell 1 or 215.8 gallons per day for Cell 2):

- Notify the Contractor LTSM Project Manager of the leakage rate.

[The Contractor LTSM Project Manager shall notify the DOE–GJO LTSM Project Manager of the leakage rate. It is the DOE–GJO LTSM Project Manager’s responsibility to notify EPA and UDEQ of leakage into the LDS. The Contractor LTSM Project Manager shall implement the contingency actions specified in the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a), including re-evaluation of design mixing calculations.]

- Check the LCR pump and controls for proper operation and correct deficiencies as required.
- Sample the LDS leachate in accordance with Section 3.5.4 of this procedure. The LDS shall be sampled on a quarterly basis for heavy metal, radiologic components, characteristic hazardous waste placed in the repository, and common ions as specified in Appendix C, *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a). In addition to the quarterly sampling, sample the LDS on an annual basis for the constituents listed in Appendix H of the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a).
- Inspect the main drain leachate collection pipe with a television camera to determine the location of leachate leakage.

3.5.3 Entering Manholes

There are five manholes, identified as Manhole #1 through Manhole #5, associated with the repository LCRS and LDS. [Figure 3–2](#) illustrates the location of each of the manholes. Occasionally it may be necessary for the Monticello LTSM Representative to enter the manholes to service pumps, collect samples, inspect piping, or conduct other maintenance activities.

Manholes located at the Monticello Repository are non-permit confined spaces and are in a radioactive controlled area. Entry into the manholes shall be conducted in accordance with the requirements of the *Monticello LTSM Project Safety Plan* (DOE 2001a). The Monticello LTSM Representative, acting in the capacity of the radiological control technician and the site safety supervisor, shall ensure adherence to entry and exit procedures into a radioactively controlled area. Radioactively controlled area entry and exit procedures are provided in Section 4.4.2 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001c).

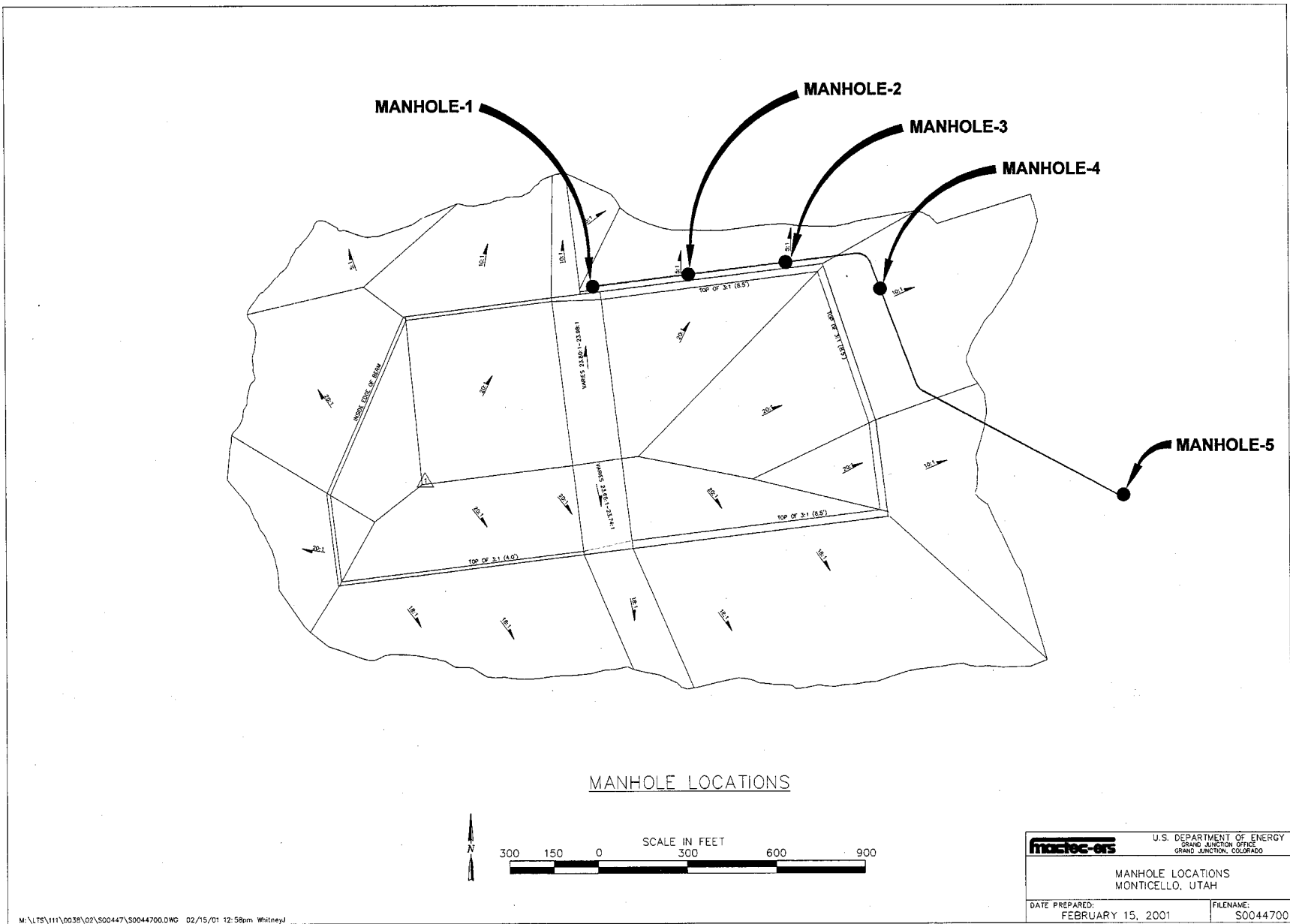


Figure 3-2. Manhole Locations

The potential for radon gas to collect in the manholes exists because the manholes extend below the repository cover; therefore, ventilation is required prior to entry into the manholes. The oxygen content must be verified to be adequate prior to entering the manholes.

Prior to any personnel entering any manhole, the Monticello LTSM Representative shall:

- Open the cover of the manhole and secure the latch.
- Ensure that a competent person with a communication device (radio or cell phone) remains outside of the manhole to assist in an emergency.
- While standing outside of the manhole, ventilate the manhole airspace by placing the 8-inch exit duct of the ventilation fan into the manhole at the level where work will be conducted. Ensure that the intake of the fan remains outside of the manhole. Plug the fan into the electrical outlet provided near the top of the manhole and ventilate for a minimum of 15 minutes. This procedure is also addressed in a job-safety-analysis provided in the *Monticello LTSM Project Safety Plan* (DOE 2001a).
- Entry into the manhole is only allowed if the oxygen concentration is greater than 19.5 volume per cent oxygen. Determine the oxygen content of the manhole atmosphere by following the MSA Combustible Gas and Oxygen Alarm meter operating procedure. A copy of this procedure is kept with the instrument in the Monticello Field Office.
- If the oxygen concentration is less than or equal to 19.5 percent, continue aerating the manhole with the fan. Upon obtaining greater than 19.5 percent oxygen, personnel may enter the manhole.
- The fan shall remain in operation at all times while personnel are in the manhole. Additionally, the Monticello LTSM Representative shall continue monitoring the oxygen content to ensure that it exceeds 19.5 percent. If the oxygen content falls below 19.5 percent, all personnel shall be evacuated immediately from the manhole.
- Follow the procedures for entry into a radioactively controlled area as provided in Section 4.4.2 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001c).
- Conduct any work required in accordance with the requirements of the *Monticello LTSM Project Safety Plan* (DOE 2001a).
- Follow the procedures for exiting from a radioactively controlled area as provided in Section 4.4.2 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001c).
- Upon completion of work in the manhole, replace and secure (lock) the manhole cover.

3.5.4 Sampling of Leachate

Events that trigger sampling of the Repository are specified in Appendix C, the *Repository and Pond 4 Groundwater Contingency Plan*. In accordance with this plan, no sampling of the LCRS for the Repository is required.

If water is detected in LDS1 or LDS2 of the Repository, the Monticello LTSM Representative shall sample the leaking LDS quarterly for heavy metals, radiologic components, common ions, and hazardous waste constituents that were placed in the repository. Water has been detected in these LDSs; therefore, quarterly sampling is required until the influent to the LDSs ceases.

Table 3–1 identifies the individual analytes for each of these generic groupings.

Table 3–1. Contingency Plan Sampling—Quarterly

| Heavy metals | | | | |
|---|-----------------|----------------|----------------------------|-----------------|
| Antimony | Arsenic | Barium | Beryllium | Cadmium |
| Chromium | Copper | Iron | Lead | Manganese |
| Mercury | Molybdenum | Nickel | Selenium | Silver |
| Strontium | Vanadium | Zinc | | |
| Radiologic Components | | | | |
| Gross Alpha | | | | |
| Combined Radium-226 and Radium-228 | | | | |
| Combined Uranium-234 and Uranium-238 | | | | |
| Common Ions | | | | |
| Calcium | Chloride | Magnesium | Nitrates as N | Sodium |
| Sulfates | Carbonate | Bi-Carbonate | Potassium | |
| Hazardous Waste Constituents ^a | | | | |
| Cadmium (D006) | Chromium (D007) | Lead (D008) | Mercury (D009) | Selenium (D010) |
| Arsenic (D004) | Barium (D005) | Benzene (D018) | Methyl ethyl ketone (D035) | |

^aWaste designated as D001 (ignitability characteristic) was placed in the repository, but because the waste exhibiting this characteristic was solidified prior to placement in the repository, it no longer can be classified as a D001 waste. Therefore, samples will not be collected for ignitability characteristic testing.

In addition to quarterly sampling identified above, if water is detected in LDS1 or LDS2 of the Repository, the Monticello LTSM Representative shall conduct annual sampling. If water is detected in LDS1 or LDS2 of the Repository, the Monticello LTSM Representative shall sample the leaking LDS annually for the components identified in Table 3–2. Individual analytes for each of these generic groupings are provided in Appendix H of the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998). Although some of the group names of the annual sampling are similar to the group names for quarterly sampling, individual analytes are significantly different.

Table 3–2. Contingency Plan Sampling—Annual

Target Compound List Volatile Organic Compounds
 Target Compound List Semi Volatile Organic Compounds
 Target Compound List Polychlorinated Biphenyls and Pesticides
 Priority Pollutant Metals List (plus additional metals present in tailings)
 Radiological Constituents
 Common Ions
 Field Measurements

Preservation of sample aliquots for various analytes, sampling technique, completion of sample documentation, and chain of custody requirements as described in Appendix E, the *Repository and Pond 4 Groundwater Contingency Sampling and Analysis Plan* (DOE 2000).

Sample bottle requirements are provided in [Table 3–3](#).

Table 3–3. Sample Bottle Requirements

| Analyte | Container Type | # of bottles for sample | # of bottles for QA sample | Required for Annual Sample | Required for Quarterly Sample | Filtered | Preservative |
|--|----------------|-------------------------|----------------------------|----------------------------|-------------------------------|----------|--------------------------------------|
| TCL-VOC | 40 ml glass | 2 | 3 | Yes | No | No | Cool, HCl |
| TCL-Semi VOC | 1 L glass | 1 | 1 | Yes | No | No | Cool |
| Total Metals | 500 ml HDPE | 1 | 1 | Yes | Yes | No | HNO ₃ |
| Gross Alpha, Beta | 1 L HDPE | 1 | 1 | Yes | Yes | No | HNO ₃ |
| MEK (D035), Benzene | 40 ml glass | 2 | 3 | Yes | Yes | No | HCl |
| TCLP Metals (except Hg) | 1 L HDPE | 2 | 2 | Yes | Yes | No | None |
| CL-, PO ₄ , SO ₄ , TDS, Alkalinity | 1 L HDPE | 1 | 1 | Yes | Yes | No | Cool |
| Nitrates as N | 125 ml HDPE | 1 | 1 | Yes | Yes | No | Cool, H ₂ SO ₄ |
| Ra-222 | 40 ml glass | 2 | 2 | Yes | Yes | No | Cool |
| Ra-226 + Ra-228 | 1 L HDPE | 2 | 4 | Yes | Yes | No | HNO ₃ |
| Pb-210 | 1 L HDPE | 1 | 1 | Yes | No | No | HNO ₃ |
| Th-230, Th-232, U-234, U-238 | 1 L HDPE | 1 | 1 | Yes | Yes | No | HNO ₃ |
| TCL PCB/Pesticides | 1 L glass | 1 | 9 | Yes | No | No | Cool |

To obtain a sample from one of the LDSs, the Monticello LTSM Representative shall:

- Determine which location(s) needs to be sampled (LDS1, LDS2, or both).
- Label sample bottles in accordance with Appendix E.
- Preserve sample bottles in accordance with Appendix E.
- Enter the appropriate manhole in accordance with Section 3.5.3 of this procedure.
- Turn on the pump for the sump to be sampled as described in Section 3.2 of Appendix E.

- Monitor the LDS water level to ensure that the line has been flushed. Obtain the sample prior to pumping the sump dry.
- Open the sample valve and flush the valve for at least 10 seconds into a bucket.
- Fill the sample bottles from the sample valve in accordance with Appendix E.
- When the sample event is finished, discard purge water that was collected in the bucket into Pond 4.
- Place the pump control in the “SCADA” position.
- Exit the manhole in accordance with Section 3.5.3 of this procedure.
- Transport the samples to the Grand Junction Laboratory for analysis. Be aware of sample holding times identified in Appendix E. Based on the most recent analytical data, the repository leachate is not considered radioactive by Department of Transportation regulations; therefore, shipping papers are not required. The Monticello LTSM Representative will confirm receipt of the samples by the laboratory and note the confirmation in the Repository Record Book.

3.5.5 Annual Test of the Telemetry System

Once each year, conduct a test of the repository telemetry system to verify proper operation and calibration of the pumps, level indicators, meters, and alarms. To prevent dilution of samples, obtain any required samples prior to beginning this test. To conduct the test, pump each sump down to the preset low-level [0.8 feet (ft)], fill the sump with water, and compare the observed data with the expected data. Expected data consists of preset levels at which alarms and pumps activate. Expected data for each sump is provided in Figure 3–4. Flow rates will also be verified during the test.

3.5.5.1 Telemetry Test

Test the equipment associated with each sump (LCRS1, LDS1, LCRS2, and LDS2) using the procedure detailed below. [Figure 3–3](#) is a worksheet for recording telemetry test data and contains the expected data for each sump.

Place enough tap water or non-potable water in a water truck to fill the sump to be tested. Figure 3–4 lists the full volume (capacity) of each sump. The water truck must be fitted with at least 50 ft of flexible hose to allow transfer of the water to the LCRS and LDS via the sump flanges that are in the manholes.

The test requires one person to read the data at the remote computer and two people to manually operate the pumps and read the data at the manual readout located in the manhole. The personnel must remain in contact by radio to conduct the test.

Enter the manhole (Manhole No. 1 for LCRS1 and LDS1; Manhole No. 3 for LCRS2 and LDS2) in accordance with Section 3.5.3 of this manual.

Pump the water from the sump to be tested (i.e., LCRS1, LDS1, LCRS2, or LDS2) to Pond 4 as follows: ensure the valve to the Pond 4 transmission line is open, turn the Local Station Status

Date: _____

Monticello LTSM Representative _____

Water Levels

| | LCRS1 | | LDS1 | | LCRS2 | | LDS2 | |
|-------------------|---------------|----------|-------------|----------|---------------|----------|-------------|----------|
| | Known | Observed | Known | Observed | Known | Observed | Known | Observed |
| Low-level alarm | 0.6 ft | | 0.6 ft | | 0.6 ft | | 0.6 ft | |
| High-level alarm | 2.8 ft | | 2.5 ft | | 2.8 ft | | 2.5 ft | |
| Hi Hi level alarm | 3.3 ft | | 3.0 ft | | 3.3 ft | | 3.0 ft | |
| Pump off level | 0.8 ft | | 0.8 ft | | 0.8 ft | | 0.8 ft | |
| Pump on level | 2.8 ft | | 2.5 ft | | 2.8 ft | | 2.5 ft | |
| Sump capacity | 2,000 gallons | n/a | 324 gallons | n/a | 2,000 gallons | n/a | 324 gallons | n/a |

Flow Rates

| | LCRS1 Meter | LDS1 Meter | LCRS2 Meter | LDS2 Meter |
|--------------------------------|-------------|------------|-------------|------------|
| Observed Flow Rate | | | | |
| Minutes observed per 5 gallons | | | | |
| Calculated flow rate (gpm) | | | | |

Operational Check

| | LCRS1 | LDS1 | LCRS2 | LDS2 |
|---|-------|------|-------|------|
| Low-level alarm engages (Y/N) | | | | |
| Pump stops in Auto mode at pump off value (Y/N) | | | | |
| High-level alarm engages (Y/N) | | | | |
| Hi Hi alarm engages and sends pager notification (Y/N) | | | | |
| Pump starts in Auto mode when high-level is reached (Y/N) | | | | |

Figure 3–3. Worksheet for Annual Telemetry Test

Control Terminal switch to the Local mode, and turn the pump switch to the On position. Continue pumping until the water reaches the preset level of 0.8 ft. Ensure that the pump stops at this level.

Turn the Local Station Status Control Terminal switch to the Manual Override mode. Press and hold the pump switch in the On position. The pump switch must be held in for the pump to operate when the sump level is below 0.8 ft. Allow the sump level to reach the preset low-level alarm depth of 0.6 ft. Ensure the low-level alarm activates at the remote computer. The volume of water pumped from the sump is automatically recorded by the telemetry system. Release the pump switch to cease pumping.

Fill the sump to capacity with water from the water truck. The capacity of each LCRS is 2,000 gallons and the capacity of each LDS is 324 gallons. To perform the transfer, remove the flange of the pipe that leads to the sump and place the end of the water truck's flexible hose into the pipe. Open the water truck valve and allow the water to flow into the sump.

While the sump is filling, monitor the remote computer. Verify that the high-level alarm engages at the remote computer when the water level reaches the preset value listed in Figure 3–4. Using the level indicator, record the level at which the alarm engaged. Verify that the Hi Hi Alarm activates and sends a pager notification when the water level reaches the preset value listed in Figure 3–4.

Turn the Local Station Status Control Terminal switch to the Auto position. Verify that the pump starts automatically. Record the level at which the high-level alarm disengages. The pump should stop operating when the water level drops to 0.8 ft. Record the level at which the pump stops.

Turn the Local Station Status Control Terminal switch to the Manual Override mode. Press and hold the pump switch in the On position. Using the level indicator, record the level at which the low-level alarm engaged.

Check the calibration of the flow meter by diverting the flow from the pump into a 5-gallon bucket and manually recording the time it takes to fill the bucket. Disconnect the quick-connect coupling from the flexible hose that leads from the sump and place the end of the hose in the bucket. With the Local Station Status Control Terminal switch in the Manual Override position, press and hold the pump switch in the On position. Start the timer and record the flow rate indicated on the flow meter. Record the time (in minutes) required to transfer 5 gallons of water into the bucket. Release the pump switch to turn off the pump. Connect the flexible hose from the sump pump to the Pond 4 transmission line. Pump the sump until the water level drops to 0.6 ft by holding in the On switch. Calculate the flow rate (5 gallons divided by number of minutes) and verify the accuracy of the flow rate meter.

When the test has been completed, return the Local Station Status Control Terminal switch to the Auto position. Ensure that the volume of calibration water is not included in the total volume of water pumped from the sump by making a notation on the telemetry system water data table.

Report the findings of the annual telemetry test to the Contractor LTSM Project Manager. Correct all identified malfunctions. Corrective actions are specific to the malfunctions identified and are not specified in this procedure.

3.6 Training

To conduct the procedures outlined within this section, the Monticello LTSM Representative shall complete:

- Radiological Control Technician Training.
- LTSM Training (specifically discusses LTSM procedures).
- Sampling procedures specified in the *Environmental Procedures Catalog* (GJO 6).

3.7 Records

The following records will be generated by this procedure:

- Bound LTSM Repository Record Book.
- Inspection checklists.
- Photographs of special features taken by the Monticello LTSM Representative during routine surveillance.
- Training records.
- Telemetry Data Book.
- Sample tickets.
- Chain of custody documents.
- Analytical data packages.

3.8 References

MACTEC–ERS and *WASTREN-GJ*, (continually updated). *Grand Junction Office Environmental Procedures Catalog*, GJO 6, Grand Junction, Colorado.

U.S. Department of Energy, 1998a. *Repository and Pond 4 Groundwater Contingency Plan-Final*, MAC-MRAP 3.5.8, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, February.

———, 1998b. *Monticello Long-Term Surveillance and Maintenance Plan*, Chapter 3, Repository Site LTSM Plan, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, September.

———, 2000. *Repository and Pond 4 Groundwater Contingency Sampling and Analysis Plan*, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, August.

———, 2001a. *Monticello LTSM Project Safety Plan*, Revision 0, GJO-2001-231-TAR, MAC-LMNT 13.2-1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, August.

U.S. Department of Energy, 2001b. *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, MAC-LMNT 1.1.1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

———, 2001c. *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II, MAC-LMNT 1.1.1-2, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

End of current text

4.0 Long-Term Surveillance and Maintenance Operating Procedures for Pond 4

4.1 Purpose

This section describes the procedures that will be used by the Monticello LTSM Representative to conduct routine surveillance of Pond 4. The purpose of routine surveillance is to ensure that (1) Pond 4 is maintained in a manner that will prevent unnecessary major repairs, (2) maintenance activities are conducted in a timely manner, (3) problems (such as tears in the liner) are detected as soon as practical, (4) unwanted intrusion by humans or other animal are detected and corrected, and (5) adequate information is gathered to lead to acceptable CERCLA five-year reviews.

4.2 Scope

The procedures within this section are applicable to the LTSM activities related to Pond 4 that are conducted by the Monticello LTSM Representative. Refer to Figure 2–1 for the location of Pond 4.

4.3 Definitions

Contractor LTSM Project Manager—Grand Junction Office-based DOE-contractor employee responsible for administering the Monticello LTSM project.

Monticello LTSM Representative—Monticello, Utah-based DOE-contractor employee residing in the Monticello area, and on call 24 hours a days, 7 days a week. A backup person is available to perform the duties required of the representative when necessary.

Inspection—Review and observation by a formally constituted team for the purpose of oversight, mobilized either at annual intervals or in response to specific concerns.

Leachate Collection and Removal System—An engineered system designed to transfer water draining from the repository or Pond 4. Schematics of the repository and Pond 4 LCRSs are provided in Appendix B, the Repository Site LTSM Plan.

Leak Detection System—Sumps designed to detect and collect water that may have leaked through the primary liner of the repository or the secondary liner of Pond 4. Schematics of the repository and Pond 4 LDSs are provided in Appendix B, the Repository Site LTSM Plan.

Surveillance—The act of monitoring or observing to determine whether an item or activity conforms to specified requirements; routine observation that does not require the involvement of formal inspection teams.

4.4 Responsibilities

Contractor LTSM Project Manager—Will be responsible for ensuring that the requirements in this procedure are conducted by the Monticello LTSM Representative, for developing necessary corrective action plans, and for implementing corrective action. If the Pond 4 liners leak, the Contractor LTSM Project Manager shall be responsible for implementing the contingency actions specified in the *Repository and Pond 4 Groundwater Contingency Plan* (see Appendix C).

Monticello LTSM Representative—Will be responsible for conducting monthly surveillances of Pond 4, conducting routine maintenance activities, monitoring water levels within the LCRS and LDS, and apprising the Contractor LTSM Project Manager of potential problems associated with Pond 4.

4.5 Procedure

Pond 4 Design

Piping extends from both the repository's primary LCRS and the LDS to Pond 4. Pond 4 is designed to serve as a containment/evaporation pond for all construction water generated during repository construction, and during the placement of tailings in the repository and for leachate (transient drainage) that could drain from the tailings material after repository construction is completed. Because characteristic hazardous waste was placed in the repository, leachate from Pond 4 could meet the definition of a hazardous waste. Therefore, Pond 4 was designed and constructed to meet the technological requirements of a hazardous-waste surface impoundment as specified in UAC R315-8. The Pond 4 design was approved by the oversight regulatory agencies.

Pond 4 is located east of the repository. With an operating capacity of 16 million gallons, Pond 4 is designed to handle a worst-case capacity scenario for leachate that could drain from the repository during post-construction. Evaporation is expected to control and reduce the contaminated liquid volume in Pond 4. If capacity of Pond 4 becomes a problem (i.e., there is insufficient capacity for transient drainage and direct precipitation on the pond), excess water either will be treated in place and discharged in accordance with all applicable environmental requirements or will be hauled to an off-site treatment facility.

The active life of Pond 4 was designed to contain the volume of transient water generated in a 30-year period. On the basis of current in-progress information, Pond 4 is expected to remain in service for 5 to 25 years.

Design features of Pond 4 consist of

- A composite primary liner (60-mil HDPE geomembrane overlaying a geosynthetic clay liner) overlying a geonet LCRS that overlies a secondary liner (single 60-mil HDPE geomembrane) overlying a geonet LDS that overlies a third composite liner (60-mil HDPE overlying a geosynthetic clay liner).

- A geonet LCRS beneath the primary liner that should collect any leakage passing through the primary liner and that will maintain a head of no more than 0.25 inch on the secondary liner.
- A geonet LDS beneath the secondary liner that should collect any leakage passing through the secondary liner and that will maintain a head of no more than 0.25 inch on the third liner.
- A 5-gallon per minute (gal/min) pump that will pump fluids collected in the LCRS sump back into Pond 4.
- Automatic electronic controls that will activate the LCRS pump at a normal high-water operating level (1-ft 6-inches deep, measured from the bottom of the LCRS sump) in the LCRS sump, record the cumulative volume of fluids pumped, record times when fluids are pumped, activate an alarm when the maximum high-water level is reached in the LCRS sump, and provide remote status and control capabilities to the Monticello LTSM Representative who can monitor and correct any operational problems that occur.
- Continuous electronic level monitoring in the LDS sump that will provide the Monticello LTSM Representative with the capability to read remote measurement levels.

EPA and UDEQ have concurred on the Pond 4 action leakage rates for the LCRS and LDS of 851 gpad (2,000 gallons per day), and 20 gpad (47 gallons per day), respectively, based on UDEQ's *Repository and Pond 4 Groundwater Contingency Plan* approval letter dated May 15, 1998. The *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a) is provided as Appendix C. As a conservative measure, leakage rates are based on the area of the floor of Pond 4, which is 2.35 acres.

The following list is a summary of the Pond 4 LTSM requirements as described in the Repository Site LTSM Plan, Appendix B:

- Monthly monitoring of the Pond 4 LDS water levels until it is decommissioned. The need to adjust monitoring frequency will be reassessed annually by DOE, UDEQ, and EPA.
- Sampling and analysis if water is collected in the LDS.

A telemetry system is installed to allow continuous real time monitoring of water levels present in the Pond 4 LCRS and LDS. Operation of the telemetry system is provided in the *Telemetry System Procedure*, Appendix D.

4.5.1 Monthly Water Level Monitoring

The Monticello LTSM Representative shall take the following actions:

Once each month, print a report containing the volume of water pumped from the LCRS and the level of water in Pond 4 LDS. Maintain this report in the Telemetry Data Book in the Monticello Field Office in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a) Section 9.0, "Records Management." Figure 3-1 (see page 3-5) is an example of the report for the Telemetry Data Book.

4.5.1.1 Water in LCRS

If water is detected in the LCRS in volumes less than the action leakage rate of 851 gpad (2,000 gallons per day), the Monticello LTSM Representative shall pump this water into Pond 4 in accordance with the procedures listed in Appendix D, *Telemetry System Procedure*.

4.5.1.2 Water in LCRS is Greater Than Action Leakage Rate

If the rate of leachate inflow into the LCRS is greater than the action leakage rate of 851 gpad (2,000 gallons per day):

- Notify the Contractor LTSM Project Manager of the leakage rate. The Contractor LTSM Project Manager shall notify the DOE–GJO LTSM Project Manager of the leakage rate. It is the DOE–GJO LTSM Project Manager’s responsibility to notify EPA and UDEQ of leakage into the LCRS.

[The Contractor LTSM Project Manager shall implement the contingency actions specified in Appendix C, *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a), including preparation and implementation of a Corrective Action Plan.]

- Ensure the high water level control and alarm in the sump are set properly so that the high-water level is not exceeded. Conduct necessary corrective action.

4.5.1.3 Zero Water in the LDS

- If the volume of water collected in the Pond 4 LDS during the month is zero gallons, notify the Contractor LTSM Project Manager.
- The need for adjusting monitoring frequency will be reassessed depending upon telemetry system data and in consultation with EPA and UDEQ.

4.5.1.4 Water in the LDS is Greater Than Zero and Less Than the Action Leakage Rate

If the rate of leachate inflow into the LDS is greater than zero gpad and less than the action leakage rate of 20 gpad (47 gallons per day):

- Notify the Contractor LTSM Project Manager of the leakage rate.

[The Contractor LTSM Project Manager shall notify the DOE–GJO LTSM Project Manager of the leakage rate. It is the DOE–GJO LTSM Project Manager’s responsibility to notify EPA and UDEQ of leakage into the LDS. The DOE–GJO LTSM Project Manager shall implement the contingency actions specified in Appendix C, the *Repository and Pond 4 Groundwater Contingency Plan*.]

- Ensure that the LDS monitoring system is properly operating.
- Remove the Pond 4 LCRS pump and place it in the Pond 4 LDS sump.

- Pump the leachate from the LDS to Pond 4 and record the rate of leakage into the LDS in the Telemetry Data Book on a daily basis. Maintain the Telemetry Data Book in the Monticello Field Office in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a), Section 9.0, “Records Management.”
- Sample the LDS leachate and Pond 4 in accordance with Section 4.5.2 of this procedure. The LDS shall be sampled on a quarterly basis for heavy metals, radiologic components, characteristic hazardous waste placed in the repository, and common ions as specified in Appendix C of the *Repository and Pond 4 Groundwater Contingency Plan*. In addition to the quarterly sampling, sample the LDS on an annual basis for the constituents listed in Appendix H of the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a).

4.5.1.5 Water in the LDS is Greater Than the Action Leakage Rate

If the rate of leachate inflow into the LDS is greater than the action leakage rate of 20 gpad (47 gallons per day):

- Notify the Contractor LTSM Project Manager of the leakage rate.
[The Contractor LTSM Project Manager shall notify the DOE–GJO LTSM Project Manager of the leakage rate. It is the DOE–GJO LTSM Project Manager’s responsibility to notify EPA and UDEQ of leakage into the LDS. The Contractor LTSM Project Manager shall implement the contingency actions specified in Appendix C, the *Repository and Pond 4 Groundwater Contingency Plan*, including evaluation of mixing calculations.]
- Ensure that the LDS monitoring system is properly operating.
- Remove the Pond 4 LCRS pump and place it in the Pond 4 LDS sump.
- Pump the leachate from the LDS to Pond 4 and record the rate of leakage into the LDS in the Telemetry Data Book on a daily basis. Maintain the Telemetry Data Book in the Monticello Field Office in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a) Section 9.0, “Records Management.”
- Sample the LDS leachate and Pond 4 in accordance with Section 4.5.2 of this procedure. The LDS and Pond 4 shall be sampled on a monthly basis for heavy metal, radiologic components, and characteristic hazardous waste placed in the repository as specified in Appendix C of the *Repository and Pond 4 Groundwater Contingency Plan*. Continue the quarterly sampling for common ions listed in Appendix C of the *Repository and Pond 4 Groundwater Contingency Plan* and annual sampling for the constituents listed in Appendix H of the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998a).

4.5.2 Sampling

Events that trigger sampling of the Repository are specified in Appendix C, the *Repository and Pond 4 Groundwater Contingency Plan*. In accordance with this plan, no sampling of the Pond 4 LCRS is required.

If water is detected in Pond 4 LDS, the Monticello LTSM Representative shall sample the leaking LDS quarterly for heavy metals, radiologic components, common ions, and hazardous waste constituents that were placed in the repository. Table 3–1 of this manual identifies the individual analytes for each of these generic groupings.

In addition to quarterly sampling identified above, if water is detected in Pond 4 LDS, the Monticello LTSM Representative shall conduct annual sampling. If water is detected in the Pond 4 LDS, the Monticello LTSM Representative shall sample Pond 4 and Pond 4 LDS annually for the components identified in Table 3–2. Individual analytes for each of these generic groupings are provided in Appendix H of the *Repository and Pond 4 Groundwater Contingency Plan* (DOE 1998). Although some of the group names of the annual sampling are similar to the group names for quarterly sampling, individual analytes are significantly different.

Preservation of sample aliquots for various analytes, sampling technique, and completion of sample documentation is described in Appendix E.

To obtain a sample from Pond 4 LDS, the Monticello LTSM Representative shall:

- Remove the pump from the Pond 4 LCRS and place it in the Pond 4 LDS.
- Label sample bottles in accordance with Appendix E.
- Preserve sample bottles in accordance with Appendix E.
- Turn on the Pond 4 LDS pump as follows:
 - Switch the mode to “SCADA,” which means Supervisory, Control, and Data Acquisition.
 - Turn the on/off switch to “On.”
- Open the sample valve and flush the valve for at least 10 seconds into a bucket.
- Fill the sample bottles from the sample valve in accordance with Appendix E.
- When the sample event is finished, discard purge water that was collected in the bucket into Pond 4.
- Turn the on/off switch to “Off.”
- Return the mode switch to “SCADA.”
- Perform a radiological contamination survey of all potentially contaminated equipment and materials in accordance with Section 4.0, “Radiologically Contaminated Materials,” of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b).

To obtain a sample from Pond 4, the Monticello LTSM Representative shall:

- Label sample bottles in accordance with Appendix E.
- Preserve sample bottles in accordance with Appendix E.
- Lower a stainless steel bucket into the pond. Depending upon the level of water in the pond, it may be necessary to attach the bucket to a rope or a pole to accomplish this.
- Fill the sample bottles in accordance with Appendix E.
- When the sample event is finished, discard excess sample that was collected in the bucket into Pond 4.
- Perform a radiological contamination survey of all potentially contaminated equipment and materials in accordance with Section 4.0, “Radiologically Contaminated Materials,” of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b).

4.5.3 Transportation of Samples

Transport the samples to the Grand Junction Laboratory for analysis. Be aware of sample holding times identified in Appendix E. Based on the most recent analytical data, the Pond 4 water is not considered radioactive by Department of Transportation regulations; therefore, shipping papers are not required.

4.5.4 Monthly Surveillance

Once each month, conduct a surveillance of the condition of Pond 4. Use the checklist provided in [Figure 4–1](#) as a guide and complete the checklist at the time of the surveillance. Conduct the surveillance in accordance with the requirements of the *Monticello LTSM Project Safety Plan* (DOE 2001c) and in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a), Section 9.0, “Records Management.” Safety equipment is provided in the life jacket box on the north side of the repository. For efficiency, this surveillance should be scheduled with the monthly Repository Surveillance.

- Drive or walk the top perimeter of Pond 4 and inspect for evidence of failed liner integrity including:
 - liner bubbling
 - visible tears
 - eroded anchor trenches
 - debris in the pond
 - vandalism (such as bullet holes) to the liner or facility

| Monthly Pond 4 Surveillance Checklist | | |
|---------------------------------------|------------------------|---------------------------|
| Monticello LTSM Representative _____ | | |
| Signature _____ | | Date _____ |
| Level of Water in Pond 4 _____ | | |
| Inspection Item | Acceptable (Yes/No) | Comments & Recommendation |
| <u>Condition of:</u> | | |
| Fences and Gates | _____ | _____ |
| Roads | _____ | _____ |
| Signs | _____ | _____ |
| Visible Piping | _____ | _____ |
| Visible Liner | _____ | _____ |
| Life Saver Station | _____ | _____ |
| Evidence of erosion of: | | |
| Top of Pond 4 Berm | _____ | _____ |
| Pond 4 Sideslopes | _____ | _____ |
| Ditches | _____ | _____ |
| Surrounding area | _____ | _____ |
| Seepage from Pond 4 | _____ | _____ |
| Overtopping of Pond 4 | _____ | _____ |
| Evidence of: | | |
| Vandalism | _____ | _____ |
| Intrusion by wildlife | _____ | _____ |
| Intrusion by humans | _____ | _____ |
| Accumulation of trash | _____ | _____ |
| Additional Comments | | |
| _____ | | |
| _____ | | |
| _____ | | |

Figure 4–1. Checklist for Monthly Pond 4 Surveillance

- Drive or walk the toe of the berm of Pond 4 and look for evidence of leakage and evidence of unwanted plant growth. Unwanted plants are noxious weeds listed by San Juan County and the state of Utah. These plants are listed in Appendix A.
- Evaluate the need for maintenance actions. Conduct minor maintenance actions that are within your capability. Notify the Contractor LTSM Project Manager of any necessary maintenance that is outside of your capability.

4.5.5 Annual Test of the Telemetry System

Once each year, conduct a test of the Pond 4 telemetry system to verify proper operation and calibration of the pumps, level indicators, meters, and alarms. To prevent dilution of samples, obtain any required samples prior to beginning this test. Conduct the test by pumping each sump down to the preset low-level listed in [Figure 4–2](#), filling the sump with water, and comparing the observed data with the expected data. Expected data consists of preset levels at which alarms and pumps activate. Flow rates are also verified during the test.

Pond 4 LCRS should be tested first. Upon completion of the test, the pump must be removed and be placed in Pond 4 LDS. Test the equipment associated with Pond 4 LCRS and Pond 4 LDS using the procedure detailed below. Figure 4–2 is a worksheet for recording telemetry test data.

4.5.5.1 Telemetry Test of Pond 4 LCRS

Place the calibrated polypropylene water tank (located in the storage yard) in a vehicle and fill it to the top calibration mark with tap water. The tank must be fitted with at least 20 ft of flexible hose to allow transfer of the water to the LCRS and LDS.

The test requires one person to read the data at the remote computer and two people to manually operate the pump and read the data at the manual readout located at the Pond 4 electrical panel.

Pump the water from Pond 4 LCRS to Pond 4 as follows: ensure the discharge hose from the pump is directed into Pond 4, turn the Local Station Status Control Terminal switch to the Local mode, and turn the pump switch to the On position. Continue pumping until the water reaches the preset level of 0.6 ft. Ensure that the pump stops at this level.

Turn the Local Station Status Control Terminal switch to the manual Override mode. Press and hold the pump switch in the On position. The pump switch must be held in for the pump to operate when the sump level is below 0.6 ft. Allow the sump level to reach the preset low-level alarm depth of 0.4 ft. Ensure the low-level alarm activates at the remote computer. The volume of water pumped from the sump is automatically recorded by the telemetry system. Release the pump switch to cease pumping.

Fill the sump to capacity with water from the water tank. The capacity of the LCRS is 145 gallons. Perform the transfer by removing the flange of the pipe leading to the sump and placing the end of the water tank's flexible hose into the pipe. Open the water tank valve and allow the water to flow into the sump. While the sump is filling, monitor the remote computer.

Date: _____

Monticello LTSM Representative _____

Water Levels

| | Pond 4 LCRS | | Pond 4 LDS | |
|------------------|-------------|----------|------------|----------|
| | Known | Observed | Known | Observed |
| Low-level alarm | 0.4 ft | | n/a | |
| High-level alarm | 1.5 ft | | 1.5 ft | |
| Hi Hi alarm | 2.0 ft | | n/a | n/a |
| Pump off level | 0.6 ft | | n/a | n/a |
| Pump on level | 1.5 ft | | n/a | n/a |
| Sump capacity | 145 gallons | n/a | 50 gallons | n/a |

Flow Rates

| | Pond 4 LCRS Meter | Pond 4 LDS Meter |
|--------------------------------|-------------------|------------------|
| Observed flow rate | | |
| Minutes observed per 5 gallons | | |
| Calculated flow rate (gpm) | | |

Operational Check

| | Pond 4 LCRS | Pond 4 LDS |
|---|-------------|------------|
| Low-level alarm engages (Y/N) | | n/a |
| Pump stops in Auto mode when low-level is reached (Y/N) | | n/a |
| High-level alarm engages (Y/N) | | |
| Pump starts in Auto mode when high-level is reached (Y/N) | | n/a |

Figure 4–2. Worksheet for Annual Telemetry Test

Verify that the high-level alarm engages at the remote computer. Using the level indicator, record the level at which the high-level alarm engaged. Verify that the Hi Hi Alarm activates and sends a pager notification when the water level reaches 2.0 ft.

Turn the Local Station Status Control Terminal switch to the Auto position. Verify that the pump starts automatically. Record the level at which the high-level alarm disengages. The pump should stop operating when the water level reaches 0.6 ft. Record the level at which the pump stops.

Turn the Local Station Status control Terminal switch to the manual Override mode. Press and hold the pump switch in the On position. Using the level indicator, record the level at which the low-level alarm engaged. Cease pumping by releasing the switch.

Check the calibration of the flow meter by diverting the flow from the pump into a 5-gallon bucket and manually recording the time it takes to fill the bucket. Place the end of the flexible hose that leads from the sump into the bucket. Turn the Local Station Status Control Terminal switch to the Manual position and turn the pump switch to the On position. Start the timer and record the flow rate indicated on the flow meter. Record the time (in minutes) required to transfer 5 gallons of water into the bucket. Turn the pump switch to the Off position. Direct the discharge from the sump into Pond 4 and pump the remaining water from the sump by turning the pump switch to the On position. Pump the sump until the water level reaches 0.4 ft. Calculate the flow rate (5 gallons divided by number of minutes) and verify the accuracy of the flow rate meter.

When the test has been completed, return the Local Station Status Control Terminal switch to the Auto position. Ensure that the volume of calibration water is not included in the total volume of water pumped from the sump by making a notation on the telemetry system water data table.

4.5.5.2 Telemetry Test Pond 4 LDS

Remove the pump from the LCRS and place it in the LDS.

Turn the Local Station Status Control Terminal switch to the manual Override mode. Press and hold the pump switch in the On position. The pump switch must be held in for the pump to operate when the sump level is below 0.6 ft. Allow the sump level to reach the preset low-level alarm depth of 0.4 ft. The volume of water pumped from the sump is automatically recorded by the telemetry system. Release the pump switch to cease pumping.

Fill the sump to capacity with water from the water tank. The capacity of the LDS is 50 gallons. Perform the transfer by removing the flange of the pipe leading to the sump and placing the end of the water tank's flexible hose into the pipe. Open the water tank valve and allow the water to flow into the sump. While the sump is filling, monitor the remote computer. Verify that the high-level alarm engages at the remote computer. Using the level indicator, record the level at which the high-level alarm engaged.

Remove the calibration water from the LDS by pressing and holding the pump switch in the On position. Ensure that the volume of calibration water is not included in the total volume of water pumped from the sump by making a notation on the telemetry system water data table. Return

the pump to the LCRS. Return the Local Station Status Control Terminal switch to the Auto position.

Report the findings of the annual telemetry test to the Contractor LTSM Project Manager. Correct all identified malfunctions. Corrective actions are specific to the malfunctions identified and are therefore not specified in this procedure.

4.6 Training

To conduct the procedures outlined within this section, the Monticello LTSM Representative shall complete:

- Radiological Worker II training and annual refreshers.
- LTSM Training (specifically discusses LTSM procedures).

4.7 Records

The following records will be generated by this procedure:

- Bound LTSM Pond 4 Record Book.
- Inspection checklists.
- Photographs of special features taken by the Monticello LTSM Representative during routine surveillance.
- Training records.
- Telemetry Data Book.
- Sample tickets.
- Chain of custody documents.
- Analytical data packages.

4.8 References

MACTEC–ERS and *WASTREN-GJ*, (continually updated). *Grand Junction Office Environmental Procedures Catalog Manual* GJO 6, Grand Junction, Colorado.

U.S. Department of Energy, 1998a. *Repository and Pond 4 Groundwater Contingency Plan-Final*, MAC-MRAP 3.5.8, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, February.

———, 1998b. *Monticello Long-Term Surveillance and Maintenance Plan*, Chapter 3, Repository Site LTSM Plan, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, September.

———, 2000. *Repository and Pond 4 Groundwater Contingency Sampling and Analysis Plan* prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, August.

U.S. Department of Energy, 2001a. *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, MAC-LMNT 1.1.1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

———, 2001b. *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II, MAC-LMNT 1.1.1-2, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

———, 2001c. *Monticello LTSM Project Safety Plan*, Revision 0, GJO-2001-231-TAR, MAC-LMNT 13.2-1 prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, August.

End of current text

5.0 Long-Term Surveillance and Maintenance Operating Procedures for the Former Millsite

5.1 Purpose

This section describes the procedures that will be used by the Monticello LTSM Representative for long-term surveillance and maintenance of the former millsite.

5.2 Scope

The procedures within this section are applicable to activities conducted on the following properties located on the former millsite: MP-00893, MP-00181, and MS-01040 (north portion). Other properties located on the former millsite are supplemental standards properties. LTSM procedures for supplemental standards properties are provided in *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b). A drawing of the former millsite is provided in [Figure 5-1](#).

5.3 Definitions

Contractor LTSM Project Manager—Grand Junction Office-based DOE-contractor employee responsible for administering the Monticello LTSM project.

Monticello LTSM Representative—Monticello, Utah-based DOE-contractor employee residing in the Monticello area, and on call 24 hours a days, 7 days a week. A backup person is available to perform the duties required of the representative when necessary.

Inspection—Review and observation by a formally constituted team for the purpose of oversight, mobilized either at regular intervals or in response to specific concerns.

Surveillance—The act of monitoring or observing to determine whether an item or activity conforms to specified requirements; routine observation that does not require the involvement of formal inspection teams.

5.4 Responsibilities

Contractor LTSM Project Manager—Will be responsible for ensuring the requirements in this procedure are conducted by the Monticello LTSM Representative.

DOE-GJO LTSM Project Manager—Will be responsible for interfacing with EPA and UDEQ.

Monticello LTSM Representative—Will be responsible for conducting the requirements in this procedure. The Monticello LTSM Representative will also be responsible for notifying the Contractor LTSM Project Manager and the Monticello City Manager of any violation of the restrictive easements included in the property deeds of the included properties.

5.5 Procedure

As part of the land transfer from DOE to the City of Monticello, restrictive easements were written into the property deeds. [Figure 5–2](#) is a map of the repository and property transferred from the DOE to the City of Monticello showing property restrictions. MP–00181 is identified as Parcel 1, MP–00893 is identified as Parcel 3, and MS–01040 (north portion) is identified as Parcel 6. Other properties with restrictions (Parcel 2, Parcel 4, Parcel 5, Parcel 7, and Parcel 8) are shown for convenience only. These properties are supplemental standards properties; LTSM activities are addressed in the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b).

The Monticello LTSM Representative shall, on a quarterly basis (every 3 months), drive or walk across properties MP–00181, MP–00893, and MS–01040 (north portion), to ensure that:

- Use of the property is restricted to public recreational use
- Habitable structures are not being built
- Overnight camping is not occurring
- Water wells have not been constructed in the shallow alluvial aquifer on MP–00181 and MP–00893. The well restriction does not apply to the north portion of MS–01040.
- Damage caused by man to wetland areas along Montezuma Creek is not occurring. Criteria for successful establishment and annual monitoring of wetlands is addressed in the *Wetlands Master Plan* (DOE 1996) and will be conducted by an environmental scientist from the Grand Junction Office. Natural damage, such as flooding from storms, to wetland areas will not be repaired. Obtain photographs of the wetland areas if damage has occurred.

The Monticello LTSM Representative shall note results of the surveillance in the Repository Record Book in accordance with record keeping requirements identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a) Section 9.0, “Records Management.”

If the property is being used for purposes other than public recreation, or habitable structures have been built, or overnight camping is occurring, or water wells have been constructed, inform the Monticello City Manager and the Contractor LTSM Project Manager of the violation of the restrictive easement included in the property deed. Inform the Contractor LTSM Project Manager of damage to wetland areas and include the source of the damage (i.e., manmade or natural).

[The DOE–GJO LTSM Project Manager will inform EPA, UDEQ, and the U.S. National Park Service of such violations.]

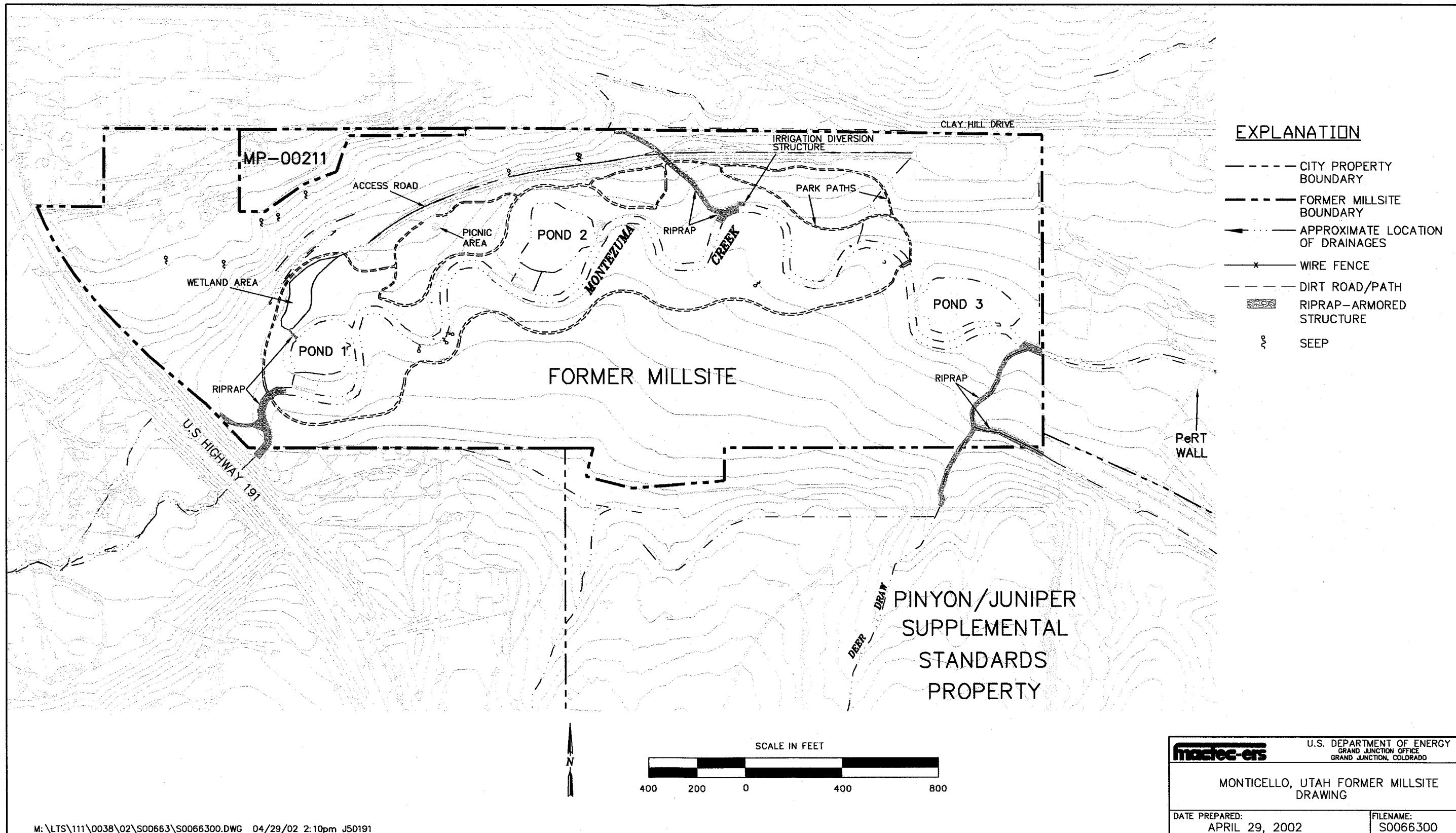


Figure 5-1. Monticello, Utah, Former Millsite Drawing

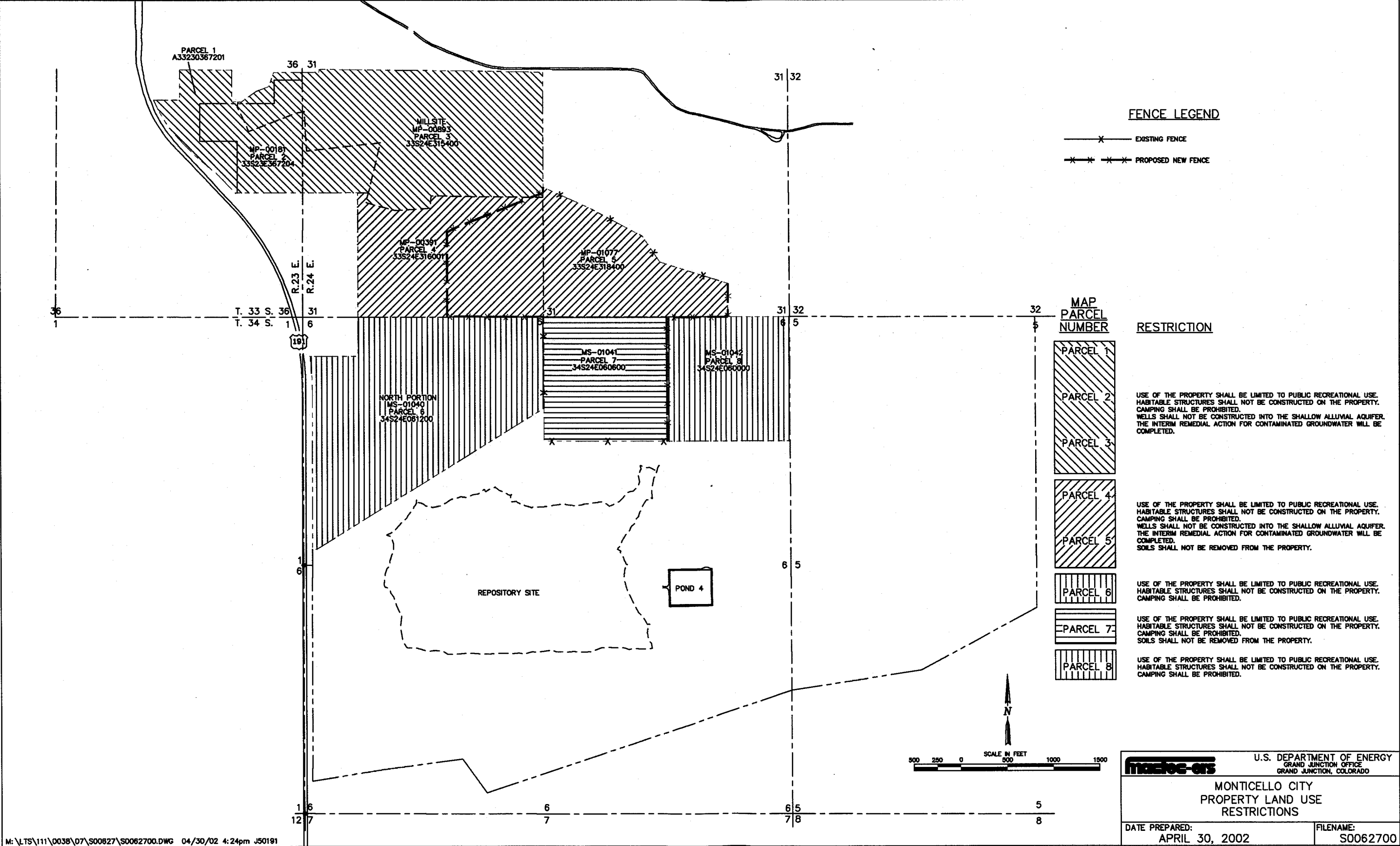


Figure 5-2. Land Transfer from Department of Energy to City of Monticello, Utah

5.6 Training

To conduct the procedures outlined within this section, the Monticello LTSM Representative shall complete:

- LTSM Training (specifically discusses LTSM procedures).

5.7 Records

The following records will be generated by this procedure:

- Bound LTSM Repository Record Book.

5.8 References

40 CFR Part 192. "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings," *Code of Federal Regulations*, July 1, 1996.

U.S. Department of Energy, 1996. *Wetlands Master Plan*, P-GJPO-926, prepared by Rust Geotech for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, March.

———, 2001a. *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, MAC-LMNT 1.1.1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

———, 2001b. *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II, MAC-LMNT 1.1.1-2, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

End of current text

6.0 Transportation of Radiologically Contaminated Material

This section establishes the transportation requirements for movement of radiologically contaminated material from Monticello to the DOE TSF and for off-site transport to a disposal facility.

6.1 Purpose

The purpose of this procedure is to ensure that (1) transport of radiologically contaminated materials is conducted under best management practices, (2) risk to human health and the environment is minimized, and (3) transporting of radiologically contaminated materials is conducted in compliance with DOT requirements.

6.2 Scope

This procedure covers transportation of bulk radiologically contaminated material, low-level radioactive calibration sources, and samples regulated by DOT as radioactive material. It covers requirements for paperwork, packaging and vehicle inspections, training, records, and spill response. The scope of this procedure specifically excludes transportation requirements for hazardous materials or wastes. If the Monticello LTSM Representative identifies suspect hazardous substances during excavations, procedures in Section 5.0, "Suspect Hazardous Substances," of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards*, Volume II (DOE 2001), will be followed.

6.3 Definitions

Carrier Operators—Drivers of vehicles that transport radiologically contaminated materials; carrier operators may include the Monticello LTSM Representative, city of Monticello or Utah Department of Transportation (UDOT) workers, or common carriers.

Certified Shipper—A person who has received DOE-approved training to ship radioactive or hazardous material and waste.

DOT Radioactive Material (DOT-RAM)—DOT-RAM is radioactive material that meets the DOT definition of radioactive material, that is, any material having a total activity exceeding 70 becquerels per gram (Bq/g). Total activity is the sum of all activities of the radionuclides present in the material.

Low Specific Activity (LSA)—LSA material is defined by the DOT to include several distinct categories. For the purposes of this procedure the DOT definition of LSA-1 [49 CFR 173.403, (I) and (iv)] is used. LSA definition (I) is: "Ores containing only naturally occurring radionuclides (e.g., uranium, thorium) and uranium or thorium concentrates of such ores." LSA definition (iv) is "Mill tailings, contaminated earth, concrete, rubble, other debris and activated material in which the Class 7 (radioactive material) is essentially uniformly distributed and the average specific activity does not exceed 10^{-6} A2/g." The A2 value is obtained from 49 CFR 173.435.

Radiologically Contaminated MaterialC Residual radioactive material resulting from DOE-related uranium and vanadium ore processing that contains Ra-226 concentrations exceeding background by more than 5 picocuries per gram (pCi/g) in the surficial 15 centimeters (cm) of soil averaged over 100 square meters (m²), or by more than 15 pCi/g on successively deeper 15 cm layers. Radiologically contaminated material with radium-226 (Ra-226) levels equal to 130 pCi/g or greater is classified as DOT-RAM. Radiologically contaminated material with Ra-226 levels less than 130 pCi/g is not DOT-regulated because it does not meet the DOT definition of radioactive material in 49 CFR 173.403.

Reportable QuantityC Quantity of material defined in Table 1, Appendix A, of 49 CFR 172.101 and referenced under 40 CFR 302.4, that if released must be reported to the EPA.

SpillC Any accidental release of petroleum products, hazardous substances, or radiologically contaminated material from packaging, containments, or transport vehicles.

Transportation Incidents or EmergenciesC Any spill, release, accident, medical situation, or potential situation that may occur while loading, unloading, or inspecting a vehicle for transport; any spill, release, accident, medical situation, or potential situation that may occur while transporting materials in a vehicle on public highways.

6.4 Responsibilities

Contractor LTSM Project ManagerC Will be responsible for:

- Oversight of LTSM program activities.
- Ensuring that the Monticello LTSM Representative receives required training.
- Providing additional assistance to the Monticello LTSM Representative in emergency situations.
- Consulting with an Environmental Specialist and a Health and Safety Specialist for incidents requiring notification to regulatory agencies.
- Reporting emergency situations and routine operations to DOE.

[DOE–GJO LTSM Project Manager shall inform EPA and UDEQ of any emergency or noncompliant situation.]

Monticello LTSM RepresentativeC Will act as the certified shipper and Radiological Control Technician (RCT). These responsibilities include:

- Characterizing any material excavated to determine if it is DOT-RAM.
- Arranging for transportation of DOT-RAM.

- Preparing shipping documentation, packaging, marking, and labeling for radioactive materials.
- Performing transportation surveys in compliance with DOT requirements.
- Arranging with qualified carriers for transporting radioactive material to the TSF or to the Grand Junction Repository.
- Follow the procedures for transferring radiologically contaminated material from the TSF in Section 7.0, "Management of the Temporary Storage Facility," of this manual.
- Ensuring that carrier operators comply with these procedures.
- Conducting documented inspections of vehicles, tarpaulins, packages, and containers to ensure that there are no leaks, spills, or damaged containers for shipments of radiologically contaminated material prior to transport.
- Responding to incidents that may occur during transport of materials.
- Contacting the DOEBGJO Security Personnel gate and emergency services in the event of an emergency. Emergency numbers are listed in Section 6.5.3 of this manual.
- Providing immediate notification and follow-up documentation to the Contractor LTSM Project Manager of incidents or potential incidents occurring during transport.
- Maintain copies of shipping related documents in the project files.
- Ensuring that the receiving facility has received the shipment by calling the receiving facility and requesting a copy of the signed shipping document.

Carrier Operators Will be responsible for transporting and handling radiologically contaminated materials in accordance with these procedures.

Environmental Specialist Will be responsible for:

- Providing support for issues associated with the off-site disposal of hazardous material and wastes.
- Preparing shipping documentation, packaging, marking, and labeling for radioactive materials mixed with other hazardous substances.
- Providing guidance for regulatory reporting and notifications.

Health and Safety Specialist Will be responsible for:

- Assisting the Contractor LTSM Project Manager and Monticello LTSM Representative with worker safety issues for transportation incidents or emergencies.

6.5 Procedure

The following procedure is used to ensure compliance with DOT for shipping radioactive material.

6.5.1 Estimation of Activity

The first step in preparing to ship radioactive material is to determine its total activity and evaluate if it is DOT-RAM. The procedure used to measure Ra-226 activity is found in *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001) Section 4.0, “Radiologically Contaminated Materials.” The material is DOT-RAM if the total activity exceeds 2,000 pCi/g. Ra-226 is measured with instrumentation but does not include activity from daughter products. To include activity from the other radionuclides in the decay chain, the Ra-226 activity for uranium mill tailings is multiplied by 15; therefore, 130 pCi/g Ra-226 equals 1,950 pCi/g total activity. As a best management practice, DOE will consider uranium mill tailings with Ra-226 activity of 130 pCi/g (total activity of 1,950 pCi/g) material to be DOT-RAM.

Figure 6–1 is a typical transport log form that shall be used to certify that the material is or is not DOT-RAM. In Part A of Figure 6–1, the data collected during excavation of the material are reviewed. If the average Ra-226 does not exceed 130 pCi/g, then the material is not DOT-RAM. It can be shipped using the procedure in Section 6.5.2, which ensures that no leakage or spill of the material occurs.

If the evaluation shows that any material in the stockpile is greater than or equal to 130 pCi/g (Ra-226), then the average activity for the stockpile must be measured. The Monticello LTSM Representative will scan the surface of the stockpile and identify areas with the highest gamma activity. Delta scintillometer measurements will be taken at the five locations with the highest gamma. If there is a large quantity of material, the pile will be gamma scanned during loading. Any stockpiled material that exceeds the high gamma values measured when the material was excavated will also be measured with a Delta scintillometer. The Delta values will be averaged and shown on Part B of Figure 6–1. If the average does not exceed 130 pCi/g Ra-226, then the material is not regulated by DOT. If the average exceeds 130 pCi/g, then arrangements shall be made to ship the material as LSA.

6.5.2 Radiologically Contaminated Material Not Regulated by DOT

Radiologically contaminated material with Ra-226 levels less than 130 pCi/g is not regulated by DOT. The following “best practice” procedure shall be used during transport of radiologically contaminated material not regulated by DOT. The Monticello LTSM Representative and/or carrier operator shall:

- Check the transport vehicle to ensure that it meets the equipment requirements specified in the LTSM Plans for supplemental standards properties. These requirements are summarized and provided below:
 - Dump trucks will be equipped with end-dump tailgate “diapers,” which will be constructed of at least a 6-mil plastic (or equivalent) and will not allow soil or liquid leakage. The tailgate diaper will extend horizontally a minimum of 4 ft into the dump

Monticello Residual Radioactive Material Transport Log Form

PART A

Residual radioactive material was excavated or stockpiled in Monticello, Utah, between the dates of _____ and _____. Based on an evaluation of the measurements collected it was determined that no residual radioactive material in excess of 130 pCi/g Ra-226 was encountered. Based on this information, the material does not require shipment as a radioactive material as defined by DOT regulations 49 Code of Federal Regulations 172-178.

Signature Monticello LTSM Representative

Date

PART B

Residual radioactive material was excavated or stockpiled in Monticello, Utah, between the dates of _____ and _____. Based on an evaluation of the measurements collected it was determined that residual radioactive material equal to or greater than 130 pCi/g Ra-226 was found. A series of at least five measurements on the highest gamma activity locations was made. The average Ra-226 concentration for the material is _____ pCi/g.

_____ The average Ra-226 concentration is below 130 pCi/g and does **not** meet the DOT definition of radioactive material, and this material does not require shipment as a radioactive material as defined by DOT regulations 49 Code of Federal Regulations 172-178.

_____ The average Ra-226 concentration is equal or greater than 130 pCi/g. This **does** meet the DOT definition of radioactive material, and this material shall be shipped in compliance with DOT regulations 49 Code of Federal Regulations 172-178.

Signature Monticello LTSM Representative

Date

Figure 6–1. Monticello Residual Radioactive Material Transport Log Form

bed, up the inside of the tailgate, and hang vertically a minimum of 12 inches over the outside of the tailgate. It also will cover the vertical edges of the tailgate by a minimum of 4 ft. The diaper will not interfere with the visibility of the tail lights, turn signals, or license plate.

- Radiologically contaminated materials will be transported with a bed cover (canvas or equal) over the loaded truck bed that will overlap the truck-bed sides, front, and back by a minimum of 6 inches. The truck will be equipped with a mechanical tarping device so that the person tarping the truck does so remotely or from the ground and is not required to climb onto or into the truck bed to cover the load.
- Before transporting radiologically contaminated material, conduct an inspection of the transport vehicle to ensure that tailgates, latching mechanisms, tarping device, and hoisting/dumping devices operate properly.
- After loading radiologically contaminated material, check the transport vehicle to ensure that there are no loose tailings or other contaminated materials on the surfaces of the transport vehicle.
- Transport the material directly to either the TSF or to a designated location at the UDOT yard. (**Note:** Monitoring, placarding, and paperwork are *not* required to transport radiologically contaminated material with Ra-226 levels less than 130 pCi/g).
- Place the material in the TSF in accordance with the procedures in Section 7.0, "Management of the Temporary Storage Facility."

6.5.3 DOT-RAM

Bulk radiologically contaminated material which meets the DOT definition of radioactive material (equal to or greater than 130 pCi/g Ra-226) will normally be shipped as LSA. If transported to the TSF it will be placed there in accordance with the procedures in Section 7.0, "Management of the Temporary Storage Facility."

As requested by UDEQ, a courtesy notification shall be made to the Utah Division of Radiation Control prior to shipping any material from the TSF to any disposal facility. The Monticello LTSM Representative shall call the Division of Radiation Control at (801) 536-4250 prior to shipping DOT-RAM.

In addition to the requirements contained in Section 6.5.2, the following DOT requirements must be met.

Shipping Papers

An example of shipping papers for an LSA shipment is shown in [Figure 6–2](#). The information in this figure may be used as a basis for completing the shipping document form. Information that must be included on shipping papers is:

- Address the shipment is going to
- Date of shipment
- Weight of the shipment (this can be estimated)
- Total activity of the shipment. This is calculated by multiplying the net weight of the shipment by the average activity.
- The proper shipping name, hazard class number, UN number and a brief description of the material, including major isotopes.
- Emergency response number
- Signatures of the hazardous materials certified shipper (normally the Monticello LTSM Representative)
- Signature of an RCT (normally the Monticello LTSM Representative)

The shipping papers shall include a copy of the appropriate emergency response guide. For LSA the emergency response guide page number is 162 (from the North American Emergency Response Guidebook), as shown in [Figure 6–3](#). The Monticello LTSM Representative will retain the blue copy of the shipping document.

A copy of exclusive use instructions shall also be included with the shipping papers. Exclusive use instructions are provided in [Figure 6–4](#).

Shipping papers must be kept within arms reach of the driver during transport of the LSA. The shipping papers may be generated in Grand Junction, Colorado, and a signed copy faxed to Monticello, Utah, for use in the shipment.

Marking and Labeling

Bulk shipments of LSA-1 are exempted from marking and labeling requirements.

| | | | | | | | | |
|--|----------|-------|-----------------------------|---|---|---|---|--------------------|
| For U.S. Department of Energy Grand Junction Office 2597 B 3/4 Road Grand Junction, Colorado 81503 970/248-6000 | | | Shipping Document | | Purchase Order Ref. N/A Requisition No. N/A | | Shipper Number 1 of 1 00-11053 | |
| Mo. Day Yr. 03 27 2000 09:10:46 | | | Date Shipped Mo. Day Yr. | | Buyer Name N/A | | Phone N/A | |
| <input checked="" type="checkbox"/> Ship to MACTEC-ERS HIGHWAY 50 CHENEY REPOSITORY WHITEWATER, CO 81527 Attn: | | | | | For Account of JOE SLADE 260 | | | |
| Transportation: # Pkgs Frt. Chgs. Mountain Region Mactec-ERS Pay Bill # 5 TONS Weight | | | | | Item Account Org Project ALL 21311 260 LTSM | | Shipment Requested by (signature) Request for Shipment Date JOE SLADE 03/27/2000 | |
| Item | Quantity | U/M | HM* | Detailed Description of Articles or Services, Must Include DOE Property No., Serial No., and Model No. HMAT: Proper Shipping Name, Hazard Class, ID No. | | | | |
| | 1 | TRUCK | X | Radioactive Material, low specific activity, n.o.s., 7, UN2912, Uranium Mill Tailings containing U-238, Th0234, Pa-234, U-234, Th-230, Ra-226, Rn-222, Po-218, Bi-214 Pb-210, Bi-210 and Pb-206 being transported to Cheney Repository for disposal. Average total activity is 2450 pCi/g Emergency Response Guide number 162 is attached. <div style="text-align: center; font-size: 2em; font-family: cursive;">SAMPLE</div> | | | | |
| Emergency Telephone (970) 248-6070 | | | | | | | | |
| Survey for Release Monticello LTSM Representative Unconditional Release <input checked="" type="checkbox"/> N/R <input type="checkbox"/> Date 3/27/2000 | | | | Authorized Signature Monticello LTSM Representative | | HMAT Certified Shipper Approval Monticello LTSM Representative | | Date 03/27/2000 |
| This is to certify that the above-named materials are properly classified, described, packaged, marked, and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation. | | | | | Property Management Authorization to Ship Not Applicable | | | |
| Equipment furnished to Seller by buyer or specifically paid for by buyer remains the personal property of the Department of Energy. If the Seller believes that furnishing used or reconditioned supplies or components will be in the Government's interest, the Seller is required to notify us in writing. The buyer reserves the right to review and reject the use of used or reconditioned supplies or components. | | | | | Warehouse Not Applicable | | | |
| Received in Good Condition by Consignee Except as Noted Company Grand Junction Disposal Site Representative By _____ Date _____ | | | | | | Consignee Please Sign and Return White Copy | | |

*Mark with "X" to designate Hazardous Material as defined in Title 49 of the Code of Federal Regulations.

GJO 1021 White—Consignee Acknowledge Blue—Purchasing/Requester Green—Property Management Numerical File Canary—Consignee Pink—Accounting Goldenrod—Miscellaneous
06/2001

Figure 6-2. Shipping Document

GUIDE 162 RADIOACTIVE MATERIALS (Low to Moderate Level Radiation)

NAERG96

POTENTIAL HAZARDS

HEALTH

- Radiation presents minimal risk to transport workers, emergency response personnel, and the public during transportation accidents. Packaging durability is related to potential hazards of material.
- Undamaged packages are safe; contents of damaged packages may cause external and/or internal radiation exposure.
- Low radiation hazard when material is inside container. If material is released from package or bulk container, hazard will vary from low to moderate. Level of hazard will depend on the type and amount of radioactivity, the kind of material it is in, and/or the surfaces it is on.
- Some material may be released from packages during accidents of moderate severity. This poses little risk to people.
- Released radioactive materials or contaminated objects usually will be visible if packaging fails.
- Some exclusive use shipments of bulk and packaged materials will not have "RADIOACTIVE" labels. • Placards, markings, and shipping papers provide identification.
- Some packages may have a "RADIOACTIVE" label and a second hazard label. The second hazard is usually greater than the radiation hazard; so follow this Guide as well as the response Guide for the second hazard class label.
- Some radioactive materials cannot be detected by commonly available instruments.
- Runoff from control of cargo fire may cause low-level pollution.

FIRE OR EXPLOSION

- Some of these materials may burn, but most do not ignite readily.
- Uranium and Thorium metal cuttings or granules may ignite spontaneously if exposed to air (see Guide 136).
- Nitrates are oxidizers and may ignite other combustibles (see Guide 141).

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- Priorities for rescue, life-saving, first aid, and control of fire and other hazards are higher than the priority for measuring radiation levels.
- Radiation Authority must be notified of accident conditions, and is usually responsible for radiological decisions.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions. • Stay upwind. • Keep unauthorized personnel away.
- Detain or isolate uninjured persons or equipment suspected to be contaminated; delay decontamination and cleanup until instructions are received from Radiation Authority.

PROTECTIVE CLOTHING

- Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide adequate protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

- When a large quantity of this material is involved in a major fire, consider an initial evacuation distance of 300 meters (1000 feet) in all directions.

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RADIOACTIVE MATERIALS (Low to Moderate Level Radiation) GUIDE 162

EMERGENCY RESPONSE

FIRE

- Presence of radioactive material will not change effectiveness of fire control techniques.
- Move containers from fire area if you can do it without risk.
- Do not move damaged packages; move undamaged packages out of fire zone.

Small Fires

- Dry chemical, CO₂, water spray or regular foam.

Large Fires

- Water spray, fog (flooding amounts).
- Dike fire-control water for later disposal.

SPILL OR LEAK

- Do not touch damaged packages or spilled material.

Liquid Spills

- Cover with sand, earth or other noncombustible absorbent material.
- Dike to collect large liquid spills.
- Cover powder spill with plastic sheet or tarp to minimize spreading.

FIRST AID

- Medical problems take priority over radiological concerns.
- Use first aid treatment according to the nature of the injury.
- Do not delay care and transport of a seriously injured person.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes.
- Injured persons who contacted released material may be a minor contamination problem to contacted persons, equipment and facilities.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

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Figure 6-3. Emergency Response Guide 162—Radioactive Materials (Low to Moderate Level Radiation)

INSTRUCTIONS FOR EXCLUSIVE USE SHIPMENT

1. This shipment must be loaded under the direction of the LTSM representative using radiologically trained personnel.
2. This shipment must be unloaded under the direction of the RCT assigned to the Grand Junction Repository using radiologically trained personnel.
3. No additional consignments may be added to the load specified in the shipping papers.
4. The load should not be handled or unloaded during transport.
5. The shipment must be transported from Monticello, Utah, to the Grand Junction Repository, Colorado, via the most direct route.
6. If problems occur during transport the driver should contact the Security Personnel at the DOE–GJO (970-248-6070). The guard will then contact the Monticello LTSM Representative and the Contractor LTSM Project Manager.

Figure 6–4. Instructions for Exclusive Use Shipment

Health and Safety Surveys

An RCT (normally the Monticello LTSM Representative) will survey the transport vehicle with a gamma dose rate instrument and a contamination survey meter in accordance with radiological survey procedures in the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b) to ensure the following requirements are met.

- Less than 10 millirem per hour (mrem/hr) at 2 meters from any surface of the vehicle.
- Less than 200 mrem/hr on any external surface of the vehicle.
- Less than 2 mrem/hr in the cab of the vehicle.
- Less than 1 rem/hr on any surface of the package (if the radioactive material is contained in a package, such as a drum, rather than the vehicle being the package.)
- Below 22 disintegrations per minute per square centimeter (dpm/cm²) alpha emitters per 300 cm².
- Below 220 dpm/cm² beta gamma per 300 cm².

The results shall be documented on the appropriate survey form, a copy of which is attached to the shipping papers.

Placarding (LSA shipment only)

The vehicle must be placarded with a Radioactive placard. Placards must be placed on each side and each end of the vehicle.

Vehicle Inspections

Before the shipment leaves the secured area, the vehicle must be inspected to insure that the requirements listed in Section 6.5.2 are met.

Carrier

Carrier operators that transport radioactive material must have the training specified in Section 6.6 and a valid commercial drivers license with a hazardous material certification.

Emergency Notification

All shipments of LSA must include an emergency contact number for notification in the event a spill of the material occurs during transportation. Before transporting the material, the certified shipper shall contact the DOEBGJO Security Personnel (970-248-6070) and provide information on the shipment (DOT regulations require a 24-hour emergency contact to be available during transportation of radioactive material). For shipments originating in Monticello, Utah, the Certified Shipper shall insure that a copy of the shipping papers is given to security personnel.

6.5.4 Spills

If a spill of radiologically contaminated material should occur during transport, the carrier operator shall:

- Stop the truck and secure the leak.
 - Put on an orange vest.
 - Place orange emergency triangles in front and behind the truck.
 - Notify his/her immediate supervisor and the Monticello LTSM Representative (**Note:** the operator's supervisor will also contact the Monticello LTSM Representative to ensure that s/he is aware of the spill).
 - Isolate the spill from public access.
- The Monticello LTSM Representative shall:
- a. Determine the extent of contamination from the spill.
 - b. Arrange for the city of Monticello to recover the spilled material under direction of the representative and transport it to the TSF.
 - c. For spills occurring outside of San Juan County, arrange to recover spilled material by calling the Radiological Emergency number listed below.
 - d. Report the spill to the DOEBGJO LTSM Project Manager

[The DOE–GJO LTSM Project Manager will then notify Utah Division of Radiation Control and UDEQ.]

- e. Investigate the spill and report findings on the DOE Incident Report form (GJO 1743). A copy of this form is available in the Monticello LTSM Representative's office.

In case of emergency, contact one or more of the following personnel:

- | | |
|---|-----------------------|
| - Police: Monticello City Police | (435) 587-2615 |
| - Fire: Monticello Fire Department | 911 or (435) 587-2500 |
| - Medical Emergency: San Juan County Emergency Medical Services | 911 or (435) 587-2237 |
| - Radiological Emergency: DOE–GJO Security Desk (staffed 24 hours/day) | (970) 248-6070 |
| - Grand Junction Office: DOEBGJO LTSM Project Manager | (970) 248-6037 |
| - Utah Division of Radiation Control | (801) 536-4250 |
| - UDEQ Monticello Project Manager | (801) 536-4219 |

6.5.5 Radioactively Contaminated Materials Mixed with Hazardous Substances

Contact the Environmental Specialist (refer to Section 5.5.1 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II [DOE 2001]) to ship radioactively contaminated materials mixed with hazardous substances. The Environmental Specialist will ship the material in accordance with DOT requirements and other applicable requirements that are dependent upon the type of hazardous substance (e.g., asbestos, polychlorinated biphenyl (PCB), hazardous waste, etc.). These requirements will be addressed by the Environmental Specialist in the waste specific management plan developed in accordance with Section 5.5.1 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001).

6.5.6 Shipment of Low-Level Radioactive Calibration Sources and Samples Containing Residual Radioactivity

If low-level radioactive calibration sources or samples containing residual radioactivity (exceeding 70 becquerels) need to be shipped, the Monticello LTSM Representative shall contact the Contractor LTSM Project Manager to obtain the assistance of an Environmental Specialist. Procedures for shipping these materials are beyond the scope of this manual.

6.6 Training

The Monticello LTSM Representative will require:

- DOE-DOT Hazmat Certified Shipper training
- RCT Training

- DOT Hazardous Materials Transportation Training, Modules 1 through 12, and 15.
- LTSM Operating procedures

Carrier operators who transport radiologically contaminated materials having Ra-226 concentrations less than 130 pCi/g will require the following training:

- LTSM Training
- General Employee Radiation Training (GERT)

Carrier operators who transport radiologically contaminated materials having Ra-226 concentrations greater than or equal to 130 pCi/g (DOT-RAM) will require the following training:

- Radiological Worker II Training and annual refreshers
- LTSM Training
- Hazardous Material Transportation Training, Modules 1, 2, 10, and 15 (driver training).

The Environmental Specialist/Certified Shipper will require the following training:

- DOT Hazardous Materials Transportation Training, Modules 1 through 12.
- Annual Resource Conservation and Recovery Act (RCRA) training

6.7 Records

The following records may be generated by this procedure:

- Shipping Papers
- DOT training records
- RAM Transport Evaluation Forms
- Incident investigation and reporting forms
- TSF record book entries

All records will be maintained in accordance with the latest revision of the LTSM Working File Index.

All records will be placed in the Monticello Information Repository.

6.8 References

49 CFR Part 172-178, "DOT Regulations."

MACTEC-ERS and *WASTREN-GJ*, (continually updated). *Grand Junction Office Health and Safety Standards*, GJO 2, Grand Junction, Colorado.

U.S. Department of Energy, 1999. *Monticello Mill Tailings Site, Application for Supplemental Standards, Government-Owned Properties in Monticello, Utah, DOE ID Nos. MPB00391B/L, MPB01041B/L, and MPB01077B/L*, GJOB98B66BTAR, Appendix E, “Long-Term Surveillance and Maintenance Plan,” prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, May.

———, 1999. *Monticello Mill Tailings Site, Operable Unit II, Application for Supplemental Standards for Upper, Middle, and Lower Montezuma Creek, Volume I*, GJOB98B58BTAR, Appendix C, “Long-Term Surveillance and Maintenance Plan for Operable Unit III Soil and Sediment Area,” prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, May.

———, 1999. *Monticello Vicinity Properties, Application for Supplemental Standards for City of Monticello Streets and Utilities*, GJOB98B68BTAR, Appendix E, “City of Monticello Streets and Utilities Long-Term Surveillance and Maintenance Plan,” prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, May.

———, 1999. *Monticello Vicinity Properties, Application for Supplemental Standards for DOE ID No. MSB00176B/L*, GJOB96B4BTAR, Appendix E, “Long-Term Surveillance and Maintenance Plan,” prepared by U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, May.

———, 1999. *Monticello Vicinity Properties, Application for Supplemental Standards, Highways 191 and 666 Rights-of-Way Within the City Limits of Monticello*, GJOB96B8BTAR, Appendix E, “Highways 191 and 666 Rights-of-Way Long-Term Surveillance and Maintenance Plan,” prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, May.

———, 2001. *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties, Volume II, MAC-LMNT 1.1.1-2*, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*, July 31, 1997.

Appendix 1 to Section 6.0

Calculations of Radium Cutoff for Transportation of Uranium Ore, Uranium Tailings, and Uranium Yellowcake

Calculation of Radium Cutoff for Transportation of Uranium Ore, Uranium Tailings, and Uranium Yellowcake

The U.S. Department of Transportation (DOT) has established 70 becquerels (bq) or 1,891 pCi/g total activity as the point at which material is classified as radioactive and must be transported under DOT regulations. For uranium ore and uranium mill tailings this cutoff point is determined indirectly by measuring the radium (Ra-226) in the ore or tailings. The Ra-226 is assumed to be present in a consistent ratio to the uranium and the other decay product. For soils containing yellowcake and other processing material that contains uranium but no significant amounts of Ra-226, the amount of uranium present can be estimated by analysis with the High Purity Germanium (HPGe) system according to procedures contained in Chapter 8, *Uranium Analysis*.

Uranium ore contains two radioactive decay chains, the U-238 chain and the U-235 chain. The U-235 chain is less abundant and produces only 4.7 percent as much activity as the U-238 chain. For uranium ore, all the decay products will be in equilibrium and will contribute the same amount of activity. For tailings, it is assumed that only 10 percent of the uranium is left after milling. The shorter-lived decay products, such as Thorium-234, that are produced directly by uranium will also be reduced to 10 percent of their original activity. For yellowcake, the uranium has been purified and is assumed to have grown back into equilibrium with the first two decay products in the U-238 chain, and with the first decay product of the U-235 chain. The tables on the following pages show the radioactive decay products for the two uranium chains and the abundances that are assumed to be present in ore, yellowcake, and tailings.

| U-238 DECAY CHAIN | | | |
|--------------------------|------------------|-------------------------|-----------------------|
| Radionuclide | Abundance in Ore | Abundance in Yellowcake | Abundance in Tailings |
| U-238 | 1.0 | 1.0 | 0.1 |
| Th-234 | 1.0 | 1.0 | 0.1 |
| Pa-234(m) | 1.0 | 1.0 | 0.1 |
| U-234 | 1.0 | 1.0 | 0.1 |
| Th-230 | 1.0 | - | 1.0 |
| Ra-226 | 1.0 | - | 1.0 |
| Rn-222 | 1.0 | - | 1.0 |
| Po-218 | 1.0 | - | 1.0 |
| Pb-214 | 1.0 | - | 1.0 |
| Bi-214 | 1.0 | - | 1.0 |
| Po-214 | 1.0 | - | 1.0 |
| Pb-210 | 1.0 | - | 1.0 |
| Bi-210 | 1.0 | - | 1.0 |
| Po-210 | 1.0 | - | 1.0 |
| Total activities present | 14.0 | 4.0 | 10.4 |

| U-235 DECAY CHAIN | | | |
|--------------------------|------------------|-------------------------|-----------------------|
| Radionuclide | Abundance in Ore | Abundance in Yellowcake | Abundance in Tailings |
| U-235 | 1.0 | 1.0 | 0.1 |
| Th-231 | 1.0 | 1.0 | 0.1 |
| Pa-231 | 1.0 | - | 1.0 |
| Ac-227 | 1.0 | - | 1.0 |
| Th-227 | 1.0 | - | 1.0 |
| Ra-223 | 1.0 | - | 1.0 |
| Rn-219 | 1.0 | - | 1.0 |
| Po-215 | 1.0 | - | 1.0 |
| Pb-211 | 1.0 | - | 1.0 |
| Bi-211 | 1.0 | - | 1.0 |
| Tl-207 | 1.0 | - | 1.0 |
| Total activities present | 11.0 | 2.0 | 9.2 |

The total activity present in the ore will be the sum of the activities from the U-238 decay chain plus 4.7 percent of the activity from the U-235 chain.

$$14 + (0.047 (11)) = 14.52$$

Similarly for uranium tailings:

$$10.4 + (0.047 (9.2)) = 10.83$$

For yellowcake and process materials:

$$4.0 + (0.047 (2.0)) = 4.09$$

These activities can then be divided into the DOT cutoff activity of 70 bq/gram (1891 pCi/g) to determine how much Ra-226 is present at the cutoff level.

For ore:

$$\frac{1891}{14.52} = 130.23 \text{ pCi/g}$$

for tailings:

$$\frac{1891}{10.83} = 174.6 \text{ pCi/g}$$

and for yellowcake and process materials:

$$\frac{1891}{4.09} = 462.34 \text{ pCi/g}$$

For ease of use, the decimals are dropped off and the cutoffs become those shown in the table below.

| DOT RADIOACTIVE MATERIAL VALUES | | |
|--|--|------------------------------|
| Material | Cutoff Value (equal to or greater than) | Multiplier for Ra-226 |
| Uranium Ore | 130 pCi/g Ra-226 | 15 |
| Uranium Yellowcake and process material which contains uranium but do not contain Ra-226 | 462 pCi/g total uranium | 4 |
| Uranium Tailings | 174 pCi/g Ra-226 | 11 |

When shipping samples, it may be necessary to determine the approximate activity for the package. If the type of material is known, the total activity in the package can be estimated by the following formula.

$$\text{package activity} = \text{sample weight (grams)} (\text{ activity (pCi/g)} (\text{ multiplier}$$

If the type of material (ore, tailings, or yellowcake) cannot be determined, then the most conservative limit (130 pCi/g), and the most conservative multiplier (15) should be used.

End of current text

7.0 Management of the Temporary Storage Facility

7.1 Purpose

This section provides operating procedures and guidance for management of the TSF and the safe handling and control of radiologically contaminated material at the TSF.

7.2 Scope

This procedure is applicable to the management of radiologically contaminated material at the TSF in Monticello, Utah. In the unlikely event that radiologically contaminated material containing other hazardous substances are managed at the TSF, the Contractor LTSM Project Manager shall be informed in accordance with the procedures described in Section 5.0 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b) prior to moving the material to the TSF. At the TSF, this material will be managed in accordance with the temporary storage criteria in 40 CFR 262.34. Therefore, the TSF will not require a RCRA permit.

7.3 Definitions

Asbestos—Material that is harmful to human health or the environment and that is specifically defined and regulated under the Toxic Substances Control Act.

Carrier Operators—Drivers of vehicles that transport radiologically contaminated materials having Ra-226 concentrations less than 130 pCi/g to the TSF; carrier operators may include the Monticello LTSM Representative or city of Monticello or UDOT workers.

Controlled Area—Any area to which access is managed in order to protect individuals from inadvertent exposure to radiation and/or radiologically contaminated materials. Individuals who enter only the controlled area without entering radiological areas are not expected to receive a total effective dose equivalent of more than 100 mrem in a year.

CERCLA Hazardous Substance —Material that is harmful to human health or the environment and that is specifically defined and regulated under CERCLA.

Hazardous Substances—For purposes of this document, the term “hazardous substances” includes CERCLA hazardous substances present in concentrations greater than EPA’s risk-based clean-up concentrations, hazardous waste, PCBs, and asbestos. Hazardous substances have been confirmed by sampling and analysis or process knowledge to exceed EPA’s risk-based clean-up concentrations or meet the regulatory definition of hazardous waste, PCBs, or asbestos. These terms are also defined in this section.

Hazardous Waste—Waste material that is harmful to human health or the environment and that is specifically defined and regulated under RCRA.

Mixed Waste—Waste material that is regulated under RCRA as hazardous waste and meets the definition of radiologically contaminated material as provided in this section.

Polychlorinated biphenyl—Material that is harmful to human health or the environment and that is specifically defined and regulated under the Toxic Substances Control Act.

Radiologically Contaminated Material—Residual radioactive material resulting from DOE-related uranium and vanadium ore processing that contains Ra-226 concentrations exceeding background by more than 5 pCi/g in the surficial 15 cm of soil averaged over 100 m², or by more than 15 pCi/g in successively deeper 15-cm layers.

Radioactive Material Area—An area or structure where radiologically contaminated material in excess of 130 pCi/g Ra-226 is used, handled, or stored.

7.4 Responsibilities

Monticello LTSM Representative—Will be responsible for:

- Managing the TSF.
- Performing radiological surveys and monitoring at the TSF.
- Conducting routine inspections of the TSF.
- Maintaining appropriate postings at the TSF.
- Ensuring that all personnel entering the facility are trained in accordance with the training requirements listed in Section 7.6 of this procedure.
- Ensuring that carrier operators complete entries in the TSF Record Book in accordance with these procedures.
- Keeping records of TSF activities.

Carrier Operators—Will be responsible for transporting and handling radiologically contaminated materials in accordance with these procedures.

Contractor LTSM Project Manager—Will be responsible for overall implementation of these procedures.

City of Monticello Workers—Will be responsible for adhering to these procedures and for conducting work in accordance with direction received from the Monticello LTSM Representative.

UDOT Workers—Will be responsible for adhering to these procedures and for conducting work in accordance with direction received from the Monticello LTSM Representative.

7.5 Procedures for Managing the TSF

7.5.1 TSF Entry and Exit Procedure

The Monticello LTSM Representative should escort all personnel entering the TSF. Under emergency situations, however, carrier operators who work for the city of Monticello and UDOT who are trained in accordance with Section 7.6 of this procedure may enter the TSF without a DOE escort. The Monticello LTSM Representative shall escort all visitors to the TSF.

The Monticello LTSM Representative and carrier operators shall:

- Ensure that the gate to the TSF is locked at all times when personnel are not present.
- Upon entry into the TSF, sign the entry log of the TSF Record Book, which is located in the storage shed. [Figure 7-1](#) shows the template for the entry log.
- Record entries in the TSF Record Book legibly and with indelible ink.
- Upon exiting the TSF, note the time in the Entry Log section of the TSF Record Book.
- After exiting the TSF, lock the gate.

7.5.2 Material Transfer and Storage

The Monticello LTSM Representative and carrier operators shall:

- Ensure that only the following material is transferred to and stored at the TSF:
 - Radiologically contaminated material.
 - Unsurveyed material that needed to be removed from a supplemental standards property due to an emergency.
 - Radiologically contaminated material that contains other hazardous substances (mixed wastes) (**Note:** Management and transfer of radiologically contaminated hazardous substances are beyond the scope of these procedures; if radiologically contaminated hazardous substances are stored at the TSF, an Environmental Specialist from GJO will be responsible for their transfer and management).

Transfers of Radiologically Contaminated Material to the TSF

The Monticello LTSM Representative and/or carrier operators shall:

- Transfer all radiologically contaminated material to the concrete or rolloff bins except for known mixed waste materials.
 - When radiologically contaminated material in the concrete or rolloff bins is suspected of exceeding 130 pCi/g, it shall be managed as a radiological contamination area.
- When radiologically contaminated material with Ra-226 concentrations less than 130 pCi/g and unsurveyed material are transferred:
 - Clean out the transport vehicle and equipment used to transfer the material with a broom to the extent that visible contamination is removed.
 - Place the sweepings into the same container as the transferred material.
 - Ensure the cover of the concrete bin or rolloff bins is tightly closed.
 - Keep broom (or other tools used for cleaning) within the area.

[illegible]

Figure 7–1. Template for Entry Log Section of the TSF Record Book

- When radiologically contaminated material with Ra-226 concentrations greater than or equal to 130 pCi/g is transferred:
 - Decontaminate the transport vehicle and equipment in accordance with instructions provided by the Radiological Control Manager. The Radiological Control manager is identified in the *Monticello Long-Term Surveillance and Maintenance Administrative Manual* (DOE 2001a). (**Note:** The Monticello LTSM Representative will ensure that decontamination is only conducted by personnel with current Radiation Worker II training and that equipment is frisked and free released.)
- In the event that unsurveyed material is transferred to the TSF by city of Monticello workers, city workers shall deposit the material in the concrete or rolloff bins and call the Monticello LTSM Representative and request that a radiological survey be conducted. The Monticello LTSM Representative will survey the material in accordance with Section 3.0 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b) and complete documentation and storage requirements listed in Section 7.5.2 of this procedure. The Monticello LTSM Representative shall inspect the material for hazardous waste, PCBs, and asbestos.
- Make applicable material transfer notations in the TSF Record Book.

Transfers of Radiologically Contaminated Material from TSF to Grand Junction Disposal Cell

When the concrete bin approaches 75-percent capacity, the material shall be shipped to an appropriately licensed disposal facility. Currently, the Grand Junction disposal cell near Whitewater, Colorado, is the facility designated for disposal of radiologically contaminated material from the TSF.

The Monticello LTSM Representative shall:

- Contact the Contractor LTSM Project Manager to make arrangements to ship the material from the TSF to the disposal facility.
- Contact the Utah Division of Radiation Control to provide a courtesy notification of the impending shipment.
- Ship the material from the TSF to the disposal facility in accordance with Section 6.0 of this manual.
- Make applicable material transfer notations in Material Transfer section of the TSF Record Book.

Transfers of Radiologically Contaminated Material Containing Other Hazardous Substances

The TSF meets the substantive requirements to compliantly store hazardous substances, hazardous wastes, PCB material, and asbestos. Administrative requirements (such as obtaining permits and notification of regulated waste activity) are not required for on-site response actions at CERCLA sites, as specified at 40 CFR 300.440(e). However, management plans for the specific type of waste will be developed to demonstrate that the substantive storage requirements

are met. These management plans (which will address transportation, storage for disposal, inspections, marking, etc.) are beyond the scope of this procedure. In the unlikely event that radiologically contaminated material containing other hazardous substances is stored at the TSF, the Contractor LTSM Project Manager will provide an Environmental Specialist to develop a management plan specific to the type of waste in storage.

The Monticello LTSM Representative shall:

- Adhere to the management plan developed by the Environmental Specialist in accordance with the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b) Section 5.0, “Suspect Hazardous Substances,” for transfer, storage, and management of radiologically contaminated material containing other hazardous substances.

7.5.3 Inspections

The Monticello LTSM Representative shall:

- Inspect the TSF weekly to determine if containers, rolloff bins, concrete bin, and covers are in good condition.
- Ensure that rolloff bins and containers remain closed except when material is being added or removed.
- Ensure that rolloff bins and containers are identified with a unique number.
- Inspect the postings that are identified in Section 7.5.4 of this procedure and ensure that they are in good condition.
- Inspect the fence surrounding the TSF and ensure that it remains in good condition.
- Inspect the TSF Record Book to ensure that radiological monitoring has been conducted in accordance with Section 7.5.5 of this procedure.
- Record results of the inspection and applicable notations in Inspection Report section of the TSF Record Book (see [Figure 7–2](#)).

7.5.4 Radiological Posting Requirements

Radiological posting shall be conducted in accordance with *Grand Junction Office Site Radiological Control Manual* (GJO 3). The TSF is divided into:

- A concrete bin where all radiologically contaminated material will be stored.
- A rolloff bin storage area. Bins are anticipated to be used for segregation of unsurveyed material or mixed waste.
- A drum storage area.
- A storage shed for storage of nonradiologically contaminated support equipment.

**Monticello Long-Term Surveillance and Maintenance Program
Temporary Storage Facility Record Book
Inspection Report**

- _____ Date of Inspection
- _____ Was the gate locked upon arrival?
- _____ Are signs posted in accordance with Section 7.5.4 of the LTSM Operating Procedures Manual, Volume I?
- _____ Are all postings legible?
- _____ Are enclosures on all bins and containers tight?
- _____ Are containers in good physical condition (i.e., no rust, no holes, no bulges, etc.)?
- _____ How much radiologically contaminated material is in the concrete bin?
Note: the material should be shipped when the volume in storage approaches 75 percent of the storage capacity.
- _____ Is the surface area of the TSF in good physical condition (no erosion, no flood damage etc.)?
- _____ Has radiological monitoring been conducted in accordance with Section 7.5.5 of the LTSM Operating Procedures Manual, Volume I?
- _____ If material is contained in rolloff bin(s), has the material been radiologically surveyed?
- _____ Is the security fence in good condition?

Comments: _____

Signature of Monticello LTSM Representative

Figure 7–2. Template for Inspection Report Section of the TSF Record Book

The Monticello LTSM Representative shall ensure that the following posting requirements for these areas are met:

- The entire TSF is a controlled area. The TSF fence shall be posted at a minimum of 100-ft intervals with signs containing the following information: “Controlled Area; Enter at Designated Access Only; Worker-GERT Required for Access; Visitor-Radiological Orientation or Escort Required for Access.”

The concrete bin and rolloff bins are for storage of radiologically contaminated material and unsurveyed material. The bin(s) shall be posted with one sign stating “Low-level radioactive soil and materials contaminated with uranium ore and mill tailings; radioactivity concentrations exceed the environmental cleanup levels specified in 40 CFR 192.”

- The storage area will be posted in accordance with *Grand Junction Office Site Radiological Control Manual* (GJO 3). If radiologically contaminated material is suspected of exceeding 130 pCi/g, the area shall be posted with yellow and magenta signs containing the universal radioactive symbol (trefoil) and the following words: “Caution: Radioactive material stored or handled in this area.” A minimum of one sign shall be placed on each side of the RMA. The interval between signs shall not exceed 100 ft.

7.5.5 Radiological Monitoring

The Monticello LTSM Representative shall:

- Conduct routine radiological surveys in accordance with Section 3.0 of the *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II (DOE 2001b), and with the following minimum frequencies:
 - Weekly surveys of areas with Ra-226 levels less than 130 pCi/g are required. However, if personnel enter the area less frequently than on a weekly basis, then surveys shall only be required when personnel enter the area.
 - After a leak or spill of radiologically contaminated materials.
- Place a copy of all monitoring results in Radiological Monitoring Results section of the TSF Record Book (see [Figure 7-3](#)).

[illegible]

^bCross reference to the file location of the survey map.

DOE/Grand Junction Office
April 2002

7.6 Training

The Monticello LTSM Representative shall be currently qualified as an RCT.

To enter the TSF, personnel must have current General Employee Radiological Training and LTSM training. Visitors may enter the TSF without this training provided they are accompanied by a trained escort.

To enter the RMA portion of the TSF, personnel must have current Radiological Worker II and LTSM training. Visitors may enter the TSF without this training provided they are accompanied by a trained escort.

7.7 Records

The following records will be generated by this procedure:

- The TSF Record Book, which contains names and dates of personnel entry, maintenance activities, radiological survey results, and notations concerning movement of material (e.g., dates, destination, and quantity of material moved).
- Training records.

All records will be maintained in accordance with the latest revision of the LTSM Working File Index.

All records will be placed in the Monticello Information Repository.

7.8 References

10 CFR Part 835. "Occupational Radiation Protection," Subpart H Records, *Code of Federal Regulations*, January 2000.

MACTEC-ERS and *WASTREN-GJ*, (continually updated). *Grand Junction Office Site Radiological Control Manual* GJO 3, Grand Junction, Colorado.

U.S. Department of Energy, 2001a. *Monticello Long-Term Surveillance and Maintenance Administrative Manual*, MAC-LMNT 1.1.1, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

———, 2001b. *Monticello Long-Term Surveillance and Maintenance Operating Procedures for Supplemental Standards Properties*, Volume II, MAC-LMNT 1.1.1-2, prepared by MACTEC Environmental Restoration Services, LLC for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, December.

Appendix A

Photographs of Utah and San Juan County-Listed Noxious Weeds

Photographs taken from:

Weeds of the West,

Tom D. Whitson, Editor

published by The Western Society of Weed Science, Newark, California

Revised 1992

Appendix B

Repository Site LTSM Plan

Note: This Appendix is Chapter 3, Repository Site LTSM Plan, of the *Monticello Long-Term Surveillance and Maintenance Plan* (September 1998)

Appendix C

Repository and Pond 4 Groundwater Contingency Plan (February 1998)

Note: Appendices to this plan are not included

Appendix D

Telemetry System Procedure

Appendix E

Repository and Pond 4 Groundwater Contingency Sampling and Analysis Plan (August 2000)